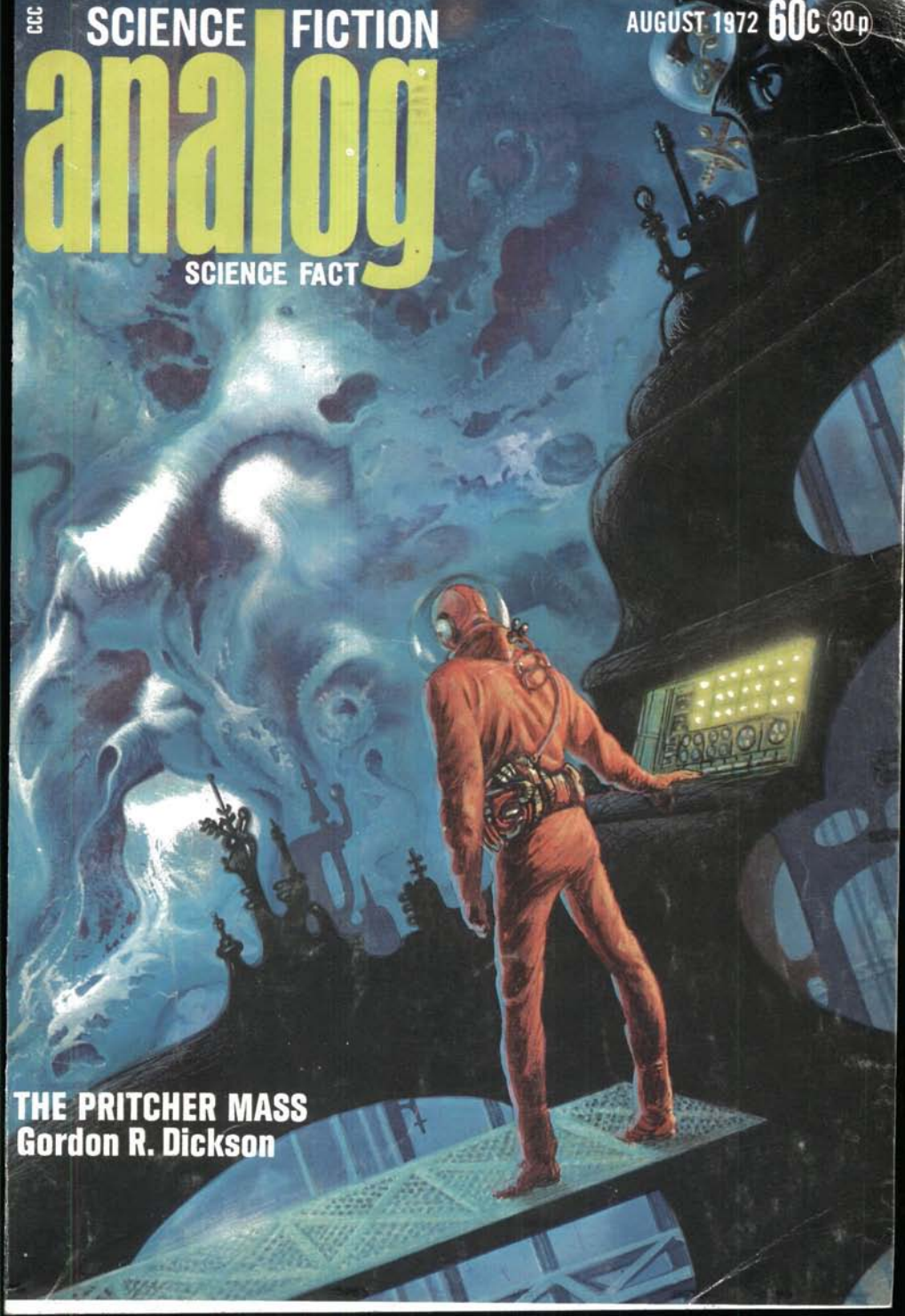

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EDITORIAL

the disasters that weren't

November 7, 1971 was an important day in the history of science. A disaster didn't happen.

The underground nuclear bomb test code-named "Cannikin" took place on that day, on Amchitka Island in the Aleutians. Despite the doubts of some scientists and the hysterical warnings of doom by many self-styled environmentalists, there was no cataclysm. The last time anyone looked, Amchitka was still there. Radioactivity release was nil. Four empty bird's-nests were destroyed. A dozen or so animals killed. No earthquake. No tidal wave sweeping the Pacific.

Vast disappointment for those who were looking forward to the end of the world.

We're witnessing an extremely unfortunate, perhaps tragic state of affairs these days. The people—who are honestly worried about the health of our planetary environment—and the scientists have allowed themselves to be maneuvered into two separate, warring camps. This is stupid. The two groups should unite forces and *really* turn the full force of humankind's concern and intellect against the problems of pollution and overpopulation.

But—in a world where the "econuts" rage against science and technology, and the scientists dither in dignified confusion asking each other what the hell "science for the people" could mean, we have a conflict. A tragic conflict.

The Amchitka bomb test marks an important point in that conflict. Important in two ways.

First, the probability of a disaster resulting from the explosion was drastically overplayed in the public press and, consequently, in the public mind. Legal actions to halt the test were pushed all the way up to the Supreme Court. The fears of earthquakes, tidal waves, and massive radioactive poisoning were given full play all around the world.

Scientists, almost to a man, kept insisting that these dangers were so unlikely that there was no reason to stop the test. Being honest men and women, though, they could not and did not say that the danger was zero.

"Aha!" came the reply from those ranged against the test. Obviously all these calming voices were lies. They were being uttered by: (a) scientists; (b) scientists working for the Government; and (c) scientists

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working for the *Department of Defense!* Credibility gapped.

There was a legitimate military reason for the test. It was needed to prove that the nuclear warhead for the Spartan long-range ABM missile would work. Whether or not the ABM system itself will work is another interesting question. But, mainly because the Department of Defense is a little harder to deter than the Bureau of Wildlife and Fisheries, the bomb went off. The fact that you're reading this shows that the predicted disasters were a teeny bit overrated.

Which brings up the second and more important point about *l'affair* Amchitka. The scientists were right. The doom-criers were patently, embarrassingly wrong.

So the public press, which had been faithfully reporting the wails of impending disaster for many months, proudly turned to the scientists and gave them a hearty clap on the back for being correct and faithful and reliable. Right?

Don't be silly. Hardly a word was said about the correctness of the scientists' predictions. When the American press had an opportunity to show that science can predict physical effects quite exactly—in fact, that science is the *only* way we have to predict events in the physical world with any certainty at all—the press turned its back on this opportunity (and responsibility) and went back to interviewing swamis.

Sic transit freedom of the press.

The Amchitka business isn't the first disaster that has failed to materialize. There are always people willing to march through the streets with signs proclaiming doomsday. Some of them will even give you the exact day and hour of the impending cataclysm. They get rather flustered when the time passes and us nasty, sinful, pride-puffed, argumentative, aggressive human beings are still here.

The advent of nuclear energy, in the mid-1940's, started a wave of gloomy doom forecasts. Hiroshima caught most scientists, and all politicians and military men, in a vast surprise. Obviously, warlike and bloodthirsty human beings would destroy themselves in short order with this too-powerful weapon. Plenty of science fiction stories have used that theme.

It hasn't happened yet. When you consider that World War I was triggered by the assassination of an archduke, and World War II's immediate excuse for starting was a quarrel over the free city of Danzig—think of the marvelous excuses we've had for starting World War III! There's been the Berlin Blockade, Korea, the Hungarian Rebellion, the Francis Gary Powers fiasco, the Bay of Pigs, the Cuban Missile Crisis, Vietnam . . . and that's a heavily edited list. Without the awful threat of nuclear devastation, America and Russia would have cheerfully marched to war over any of these issues. With city-destroying H-bombs, however, the war has been confined

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to words and "brushfire" fighting in the backwoods areas of the world.

Disasters from overpopulation, famine, and pollution are popular nowadays.

The actual facts from the real world, though, suggest that these forms of doom might not be living up to expectations. Population growth is showing signs of slowing in Latin America. In the United States, birthrate trends have already come close to the Zero Population Growth figure. In so-called "teeming" Asian nations such as Japan and Formosa, population stability has been achieved. Everyone thinks of India and China when the specter of overpopulation is discussed. We know little about Red China's population programs. India has decided its real problem is education, and is turning to direct broadcast communications satellites to beam educational information to every village on the subcontinent. The cost of putting a receiver and antenna in the villages, plus a few satellites in orbit, is within even the meager budget of India. Soon the tradition-bound villagers will be treated to modern enlightenment on the subjects of birth control, farming methods, and (presumably) government propaganda.

The "green revolution" is providing more foodstuffs for more people than ever before in the world's history. The harvest of 1971 was the largest reported in many years, and even the naturally cautious UN Food and Agriculture Organization is allowing itself a careful smile of optimism these days.

Population and food problems are real and still very severe. They haven't been conquered yet, not by a long shot. Famine exists now and may well get worse in the future. But imminent worldwide starvation is nothing more than a scare headline. The problems are solvable.

So is the pollution problem, and we're now seeing the first slow, tentative steps in what's going to be a long battle against pollution. Neither government nor industry has covered itself with glory in the pollution battle, to date. But the battle is joined.

Even here, the doom-criers are hurting themselves by overstating their case. Take DDT, for instance. Indiscriminate use of powerful insecticides can poison whole food chains, it's quite true. DDT has been found at shockingly high levels in plants and animals all over the world, even in the oceans and in Antarctica. Yet recent studies at Brookhaven National Laboratory have shown that the DDT levels found in food chain plants and animals is only about 0.03 percent of what would be expected, based on the annual output of DDT. Where does the "missing" DDT go? Obviously, there are unknown "sinks" for the stuff—perhaps it literally sinks to the bottom of the oceans.

The important point is that most of the DDT produced does not end

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up in the food chain. If we're going to get wiped out by DDT poisoning, at least it's going to take a lot longer than we first feared.

Which makes the farmers and Ministers of Health and Agriculture in the developing nations happy indeed, since they're more concerned with the immediate problems of controlling crop-eating and disease-bearing insects, than in the longer range (but equally important) problems of DDT pollution.

Pointing out dangers that everyone's ignoring is an important, vital task. And it's only natural that when you're staring a monstrous problem in the face, and no one else is paying any attention to your predicament, your voice tends to get a bit shrill. But remember the tale of the boy who cried wolf.

The real danger that the hand-wringers and doom-criers have exposed us to, is that we may be ignoring the actual dangers that we face, because so many predictions of disaster have turned out to be false alarms.

A few years ago, Professor Jay Forrester of MIT worked out a computer-modeling technique for simulating the workings of a modern business firm. With his computer model, Forrester could vary certain aspects of a firm's operation—such as price, product line, acquisition of new property, et cetera—and see how the variations affected the overall company business. Before long, For-

continued on page 177

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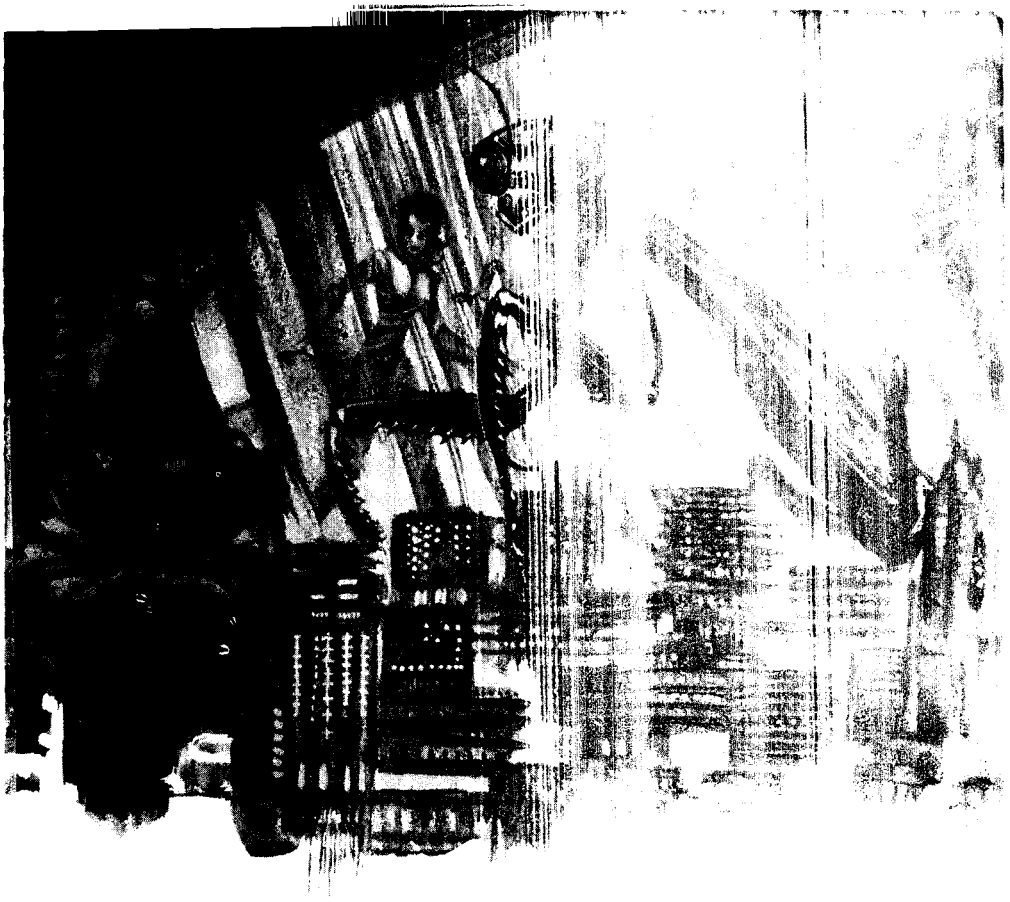

Part One of Three Parts

In a world strangling to death, the telepathic construct called the Pritcher Mass was mankind's only hope for an escape to the stars. Men and women with extrasensory powers were needed to help build the Mass. But the trouble with extrasensory powers is that when you need them most, they're most apt to fail you!

GORDON R. DICKSON

the pritcher mass

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"Late on the third day, at the very moment when, at sunset, we were making our way through a herd of hippopotamuses, there flashed upon my mind, unforeseen and unsought, the phrase, 'Reverence for Life.' . . . Now I had found my way to the idea in which affirmation of the world and ethics are contained side by side; now I knew that the ethical acceptance of the world and of life, together with the ideals of civilization contained in this concept, has a foundation in thought . . ."

–Out Of My Life And Thought
by Albert Schweitzer

Chaz Sant had evoked the familiar passage from Schweitzer out of the cluttered attic of his memory. It was to help him do battle with the grim anger still burning inside him at having once more failed the paranormals test for work on the Mass. If there was anything he believed in utterly himself, it was the cool, clean thought the old humanitarian had laid out in that passage; but the hot flame of his own always-too-ready fury was hard to put down. He knew as well as he knew his own heartbeat, that he had the special ability to pass that test. Only, it had been as if something was deliberately tripping him as he took it . . .

A sudden shrieking of railcar brakes and a heavy pressure of deceleration jerked him out of his thoughts. He lifted his head, staring around. Everyone else in the packed car was also staring around. But the brake shriek and the deceleration went on, pressing all their upright bodies hard against the straps of the commuter harnesses that protected them.

With a rough jolt, they stopped. There was a second of absolute silence; then the faint but distinct sounds of two explosions from somewhere ahead of them—so faint, in fact, that they had to come from outside the sterile seal of their car, the middle one of a three-car Commuters Special on this 18:15 run from Chicago to the Wisconsin Dells.

Then the abnormal silence was shattered by a roar of voices. It was a typical crowded day's-end run; and everyone in the car's two hundred and forty harnesses seemed to be talking at once, making guesses at what had happened. Chaz himself was strapped in next to the long window running along the right side of the car; but he could see nothing unusual beyond its double thicknesses of glass. Only a twilight, autumn-brown and weedy landscape of the unsterile outside; a field that might once have been farmed acres was now rough with clumps of aspen saplings and the occasional splash of deadly color from the golden fruit of a Job's-berry bush.

He craned his neck, trying to see up along the track forward; but at this spot it curved to the left through a stand of pines and there was nothing to be seen that way, either, but the trees and the bulging windowed

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right side of the Special's first car.

"Sabotage," said the thin woman in the harness to Chaz' immediate left. Her face was pale except for small spots of color over her prominent cheekbones; and her voice was tight. "It's always on an evening run like this. The rails are going to be torn up ahead. Our seal will get cracked, somehow; and they'll never let us back into the Dells . . ."

She closed her eyes and began moving her lips in some silent prayer, or ritual of comfort. She looked to be in her late thirties or early forties—pretty once, but time had been hard on her. The atmosphere in the car stayed noisy with speculations. After a minute, however, the train jerked and started again, slowly gathering speed. As the car Chaz was in went around the curve and emerged from the trees he got a clear view of what had halted it, spilled on the roadbed to the right of the steel tracks, less than twenty feet beyond the window and himself.

The saboteur had been a man in his mid-fifties, very thin, wearing only the cut-off trouser lower half of a jumpsuit, with a thick red knit sweater. He had apparently found an old railway speedcart somewhere—a real antique, probably from some infested museum. The little vehicle was nothing more than a platform and motor mounted on railcar wheels. This had been loaded with a number of brown cardboard cartons, possibly containing explosives. With these, he had apparently tried to ram the train head on.

What they had heard must have been two solid-missile shots from the computer-directed, seventy-five-millimeter Peace cannon on the first car. One shot had missed. There was a fresh-torn hole in the ground, five feet to the right of the tracks. The other had knocked the wheels off one side of the speedcart, and thrown cart, rider, and cargo off the tracks. If there had been explosives in the cartons, they had not gone off—probably stale. Concussion, or something like it, must have killed the saboteur himself; because there was not a mark on him although he seemed obviously dead—his open eyes staring up at the red sunset stains in the haze-thick sky, as he lay sprawled on his back by the shattered speedcart.

He was brown-skinned and emaciated with the red spots of ulcers on his throat. Plainly in the last stages of Job's-berry rot . . .

There was a long-drawn shudder of breath from the woman in the harness at Chaz' left. He glanced at her and saw that her face had no color at all now. Her eyes were open again, staring at the dead man.

"He'll have planted something else up ahead to break us open—I know he'll have," she said.

Chaz looked away from her uncomfortably. He could not blame anyone for fearing the rot. A single spore could slip through the smallest crack in a sealed environment, be in-

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haled and take root in human lungs, to grow and spread there until the one who had inhaled it died of asphyxiation. But to see someone living in a constant, morbid fear of it was something that seemed to reach inside him, take hold of a handful of his guts and twist them.

It was the sort of emotional self-torture in which his Neopuritanic aunt and cousins indulged. It had always sickened him to see them slaves to such a fear, and filled him with a terrible fury against the thing that had made slaves of them. To a certain extent, he felt the same way about all people with whom he shared this present poisoned and bottled-up world. The two conflicting reactions had made him a loner—as friendless and self-isolated as a man could be under conditions in which people were physically penned up together most of the time, as they were on this train.

He hung in his harness, watching the roadbed gravel alongside the train start to blur in the gathering darkness, as the three cars picked up speed to a normal three hundred kilometers per hour. A pair of animal eyes gleamed at him momentarily from the gloom. Animals were generally free of the rot; research for forty years had yet to find out why. It was dark enough outside now for the window to show him a shadowy image, pacing the rushing train like a transparent ghost, of the lighted car; and himself—jumpsuited, of average height, with the shock of straight black hair and the face that seemed to be scowling even when it was not . . .

Details of what had happened were being passed back by word of mouth through the rows of commuters ahead of him.

"The heat-monitoring screen picked him up through the trees around the curve," the man in front of the woman next to Chaz relayed to the two rows about them, "even before they could see him. But on the screen he was just about the size of a repair scooter. So they held speed, just keyed in the computer on the cannon and waited. Sure enough, once the comp had a clear image, it identified a saboteur, fired, and knocked him out of the way."

He twisted his neck further back over his shoulder to look at the row containing Chaz and the woman.

"Someone up ahead suggested we hold a small penitential gathering for the saboteur," he said. "Anyone back here want to join in?"

"I do," said the woman. She was one of the Neopuritans all right. Chaz shook his head at the man, who turned his own head forward again. A little later, the car attendant came pushing amongst their close ranks, vertically unwinding a roll of thin, silver, floor-to-ceiling privacy curtain; weaving it in and out among the upright shapes of the harnessed commuters to enclose those who would join in the gathering.

"Both of you here?" the atten-

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dant asked Chaz and the woman.

"Not me," said Chaz. The attendant took the curtain back on the far side of the woman into the rows behind them; and returned a little later to bring the curtain forward around her other side; so that—in theory at least—she and Chaz now occupied separate quarters aboard the packed railway car.

Chaz hung in his harness, watching the landscape, letting his mind drift. Muffled to faintness by the sound-absorption qualities of the privacy curtain, he could hear the gathering getting under way. They had already chosen a Speaker, who was lecturing now.

". . . remembering the words of the Reverend Michael Brown, twenty-three years ago: '*You are all a generation of Jobs, in sin and pain equally deserving—therefore, if your fellow seems to suffer and not yourself, do not think he or she is more guilty than you, or you more lucky, but only that your own share and time are merely delayed. They will be coming.*' Accordingly, in this gathering, all of us here recognize and admit our guilt toward a sick and polluted Earth, acknowledging that we are no better and no different from that infected and exiled fellow human, who just now would have made us like himself. In token of which we will now commence by singing Job's Doggerel Hymn. Together, now—

"The bitter fires of hell on Earth
Burn inward from periphery,
Or tainted soil the world around,
The breeding grounds of Job's-berry.

"Pray we to God of years forgot,
We pray to wood and stone.
Pray we escape from living rot.
Nor do we pray alone.

"In Neopuritanic cell,
In sealéd room and city street . . ."

. . . Chaz ceased to listen. It was one way to shut out the emotion the hymn evoked. It was not that he was less ethic-concerned than others. In his six-by-eight-by-seven-foot condominium apartment in the Upper Dells, he had a meditation corner like everyone else; its small tray of dark, sterilized earth hand-raked carefully, morning and evening. In addition, however, he had a potassium ferrocyanide crystal growing in nutrient solution, in a flask on the tray. Each morning, and evening as well, he spent a half-hour seated in front of that crystal in meditative concentration. But his particular concern during these times was not world sin; or that he be lucky in avoiding an accident that could expose him to the rot. He meditated with the spiritual grunt and sweat of a man digging a ditch.

He concentrated to develop whatever talent he had for Heisenbergian chain-perception, so that he could pass the test for work on the Pritcher Mass. So he could get his hands at last on a chance to do something about the situation that had cowed

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and was pushing to extinction his huddled people. The idea of humbly accepting his share of humanity's sins had never worked for him. He was built to fight back, even if the fight was hopeless.

If there was indeed such a thing as the chain-perception talent, he had decided some time ago, he was going to produce it in himself. And in fact, he felt that he now had. But for some reason he could not seem to make it operate during an examination for work on the Mass. This afternoon he had failed for the sixth time; and it had been a simple test. The examiner had spilled a hundred grains of rice, each dyed in one of five different colors, on a table in front of him; and given him achromatic glasses to put on.

With the glasses on, the grains had all become one solid, uniform gray—together with the desk, the room, and Mr. Alex Waka, the examiner. Waka had hid the grains for a second with a sheet of cardboard while he stirred them about. Then he had taken the cardboard away, leaving Chaz to see if he could separate out all the grains of any one color.

Chaz had worked, lining up the grains he selected, so that it would be possible to know afterwards where he had gone right, or wrong. But, when he took the glasses off he had only seventeen of the twenty red-colored grains in line before him. Of the last three grains he had selected, the first two were blue, the last yellow. Strong evidence of paranormal talent—but not proof.

"Damn it!" Chaz had snapped, as close to losing his temper as he ever let himself come nowadays. "I could feel something getting in my way on those last three choices."

Waka nodded.

"No doubt. I don't doubt you feel you did," he answered, sweeping the colored grains back into their box. He was a small, round-bodied man dressed in a sand-brown jumpsuit, a three-inch fringe haircut drooping over the low forehead of his round face. "All really potential Pritcher Mass workers seem to be self-convinced of their own talent. But a demonstration of it is what we need; and a demonstration is the one thing you haven't given me."

"How about a catalyst, Mr. Waka?" Chaz asked bluntly.

Waka shrugged.

"A lot of hokum, as far as I know," he said. "About as useful as a rabbit's foot, or a lucky charm—a psychological prop but no paranormal talent stimulant."

He looked keenly at Chaz.

"What makes you think something like that might help you?"

"A theory," said Chaz, slowly. "Have you ever heard of the species-mind idea?"

"The notion of some sort of collective unconscious, or subconscious for the human race?" Waka frowned. "That's a cult thing, isn't it?"

"Maybe," said Chaz. "But tell me something else; have you ever grown crystals in a nutrient solution?"

Waka shook his head.

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"You start out with a seed crystal," Chaz explained, "and this grows by drawing on the saturated chemical solution in which it's immersed—a solution of the same chemical composition as the seed crystal. You have to keep your solution saturated, of course, but eventually your seed crystal grows many times over."

"What about it?" Waka asked.

"Assuming there is some sort of collective unconscious—or even that I just think there's a collective unconscious to draw on," Chaz said, "then suppose I get a catalyst and can convince myself it acts like a seed crystal for my paranormal talents, which accrete around it, drawing on the nutrient solution of the collective unconscious of the mass-mind? Would it help?"

Waka shook his head.

"You have to believe you can make your talents work," he said. "That's all I know. If this, or a rabbit's foot, or anything can help you believe, then it's going to increase your apparent talents. Only—" His eyes became keen on Chaz. "As I understand it, the catalyst has to be from outside. Unsterile—and illegal."

Chaz shrugged. He carefully did not answer. He did not have a catalyst yet, in fact; or even one in prospect. But he was curious to hear Waka's reaction to the idea of his making use of something that could get him exiled from the sterile areas if it was found in his possession—in effect, condemned to death; since exposure to the outside meant death from the rot in a few months.

"Well," said Waka, after a moment's wait—and his voice changed—"let me tell you something. I believe in the salvation of humanity by one means, and one means only. That's the Pritcher Mass; which is one day going to help us transport a pure and untainted seed community of men and women to some new, clean world; so that the human race can start all over again, free from rot, spiritual as well as physical."

He paused. For a moment, he had shed a great deal of the insignificance of his tubby person and foolish haircut; and the pure light of the fanatic shone through.

"That means," he said, returning to his normal manner and tone of voice, "that as far as I'm concerned, my duty to the Mass overrides any other duty I may have, including those to purely local laws. I would not report an examinee using an unsterile object as a catalyst. Am I clear?"

"You're clear," Chaz answered. His opinion of Waka had just gone up a notch or two. But he was still wary of the examiner.

"All right," Waka said, standing up behind his desk. "Then that's that for the present. Anytime you feel you can demonstrate the necessary level of talent, call me. Night or day, at any hour. Otherwise, please remember that, like all examiners for the Mass, I've got a heavy office schedule with other people just as eager as you are to go to work out beyond Pluto's orbit.

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Good afternoon, then. May forgiveness be yours."

"Good afternoon," said Chaz.

That was that, he thought now, hanging in his train car harness. Give him a chance at a possible catalyst, and he certainly would not pass it up. As for telling Waka about such a catalyst, in spite of the examiner's hint that he would be on Chaz' side against the law in that case, that was something that still required thinking about—

Without warning, the world seemed to tilt under him. Train, car, fellow commuters, everything, seemed to fly off at an angle as a terrific pressure robbed him of breath and consciousness at once.

He woke to the painful feeling that something hard was digging into the middle ribs on his right side and something rough was pressing against his left elbow. He tried to move away from whatever was digging into his ribs and above him there was a snapping sound. He fell flat, face down on more of the rough surface that had been pressing against his left elbow.

His head clearing, he became aware that he lay under something dark on what felt like a bed of small rocks. A cold, fresh current of air, laden with outdoor smells, chilled his face. Off to his right there was a variable light source and sounds of voices.

There were other sounds of voices around and above him, in the overhanging darkness. Some made sense, but most were merely sounds of pain and shock. Lifting his head, he saw shapes lumped about him, some making noises and some not.

"They'll never let us in the Dells again," said a toneless voice almost in his ear. "Never."

It was not memory speaking, but a live and present person. He lifted himself on his hands and looked to his left, farther into the shadow beneath the overhang of darkness. Someone was seated there, as if before an altar, legs crossed; and by the voice it was the woman who had occupied the harness next to him.

He looked in the other direction and forgot her. Suddenly, everything he saw lost its reasonless, separate identity and made sense. The dark shape hanging over him was the railway car he had been in. It had fallen half on its side and broken open, spilling out him and some of the other commuters.

He crawled clear of the overhang and sat up. A broken part of his harness still circled his chest. He unbuckled it and let it fall. His head felt hot. The shape of a rock from the railroad ballast was cold under his left hand. He lifted it and laid its coolness against his forehead. The little relief of that touch brought his mind all the way back into reality.

He was outside, and it was night. The saboteur—or another—had indeed set a second trap for the train, farther down the track. If this was in fact the work of the saboteur they had encountered earlier, then his head-on

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drive at the first car had probably been to reassure the train commander that there was nothing else to fear farther up the line. But how or why the train was wrecked did not matter so much, now. What mattered was that the car Chaz was in had broken open.

He was *outside.*

He was exposed to the rot, potentially infected. According to law, neither he nor any of the other commuters in that particular car could be allowed back into a sterile area again.

Oh yes, he would.

The grim refusal to accept what had happened to him exploded instinctively inside him. He was bound for the Pritcher Mass, not doomed to wander a desolated world until he died of starvation or choked on the feathery white fungus growing inside his lungs. In this one case—his own—the inevitable must not be allowed to happen.

He took the rock from his forehead, about to toss it aside—then something stayed his hand. In the flickering light that he now saw come from the burning engine section of the first car, which lay on its side, he looked at the rock; and a word came into his mind.

Catalyst.

This was his chance, if he wanted to take it. A Heisenbergian catalyst, reportedly, was most often something just like this. A piece of wood or stone, not different from any other—illegal only because it was from an unsterilized area as this was. But it was the unsterilized catalysts that were supposed to be the only really effective ones.

Was his talent now telling him that what he held was such a catalyst—the catalyst he needed to demonstrate the talent?

His fingers clamped on the stone. He half-closed his eyes against the light of the flames forty feet away and forced his mind into channels of choice.

Chain-perception—a linked series of optimal choices among the alternates immediately available, leading to a desired end or result. His present desired end or result was simply to get back into a sealed section of the train without anyone finding out that he had been exposed to the rot-infested outer world. He held the rock tightly, searching about in his mind for the next immediate action that would *feel* as if it would lead him eventually to a safe return to the train.

He stared at the flames. A heavy-cargo rescue copter was already on the scene, down on the ground a dozen yards from the tipped-over first car. Figures in bulky sterile suits were attaching wide, pipe-like sections together into a sterile escape tunnel between the copter and the rooftop airlock on the first car; the only lock available now that the car was on its side. Each of two suited figures carried a section between them. As Chaz watched, another cargo copter settled to the ground by

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the third car and escape tunnel sections began to emerge there. It was only the second car, then, which had lost its seal; and only its passengers who would be left to starve or rot.

He felt the rough outlines of the rock biting into his palm and his fingers quivered about it. Hold on and make it work, he told himself. Hold . . . he reached out his other hand, out to his left, and his fingers brushed against something soft and cloth-like, warm and in some way comforting . . . the sleeve of the woman who had been in the harness beside him.

Abruptly, like a shudder passing through him, came his memory of how she had feared the rot—of how she had feared exactly what had just happened here. She had been exaggerating, of course. The odds were that she, or he, or any of them, would have to spend some days in the open before they would actually inhale rot spores. But probably she would not even try to make use of what little life remained to her. She would simply sit waiting for death, from what he knew of people like her.

The terrible double feeling of disgust and pity came back over him; but pity this time was stronger. He could not leave her here to die, just like that. If the catalyst and chain-perception could get him safely back into sterile surroundings without it being suspected he had been outside, it could do as much for her and him, together.

Immediately he had made the decision, it *felt* right in terms of the logic-chain-perception. Two was for some reason a good number. He leaned toward the woman and closed his hand on the slack of her sleeve.

He pulled, gently. Her murmuring, which had been going on continually all this time, broke off. For a second nothing happened, then she came toward him. Hardly thinking beyond only what seemed to be the reflexes and feelings prompting him, he moved further away from the car, getting to his feet and drawing her after him.

She came like someone in a trance. They stood, both on their feet and together in the night, a little way from the broken second car, with its sounds of despairing and injured people.

Still gripping the stone in one hand and her sleeve in the other, he looked again at the sterile-suited figures outlined by the flames of the first car. The figures carried the sections by two's, one section between each pair of them. He turned and looked at the suited figures starting to emerge from the copter opposite the last car. They also carried sections, two figures to a section.

Two—of course! That was why this series had begun with him first touching, then holding, the woman. He needed someone to help him in this chain of actions.

A feeling of certainty warmed within him. He seemed to feel the linked alternate choices that would

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bring both of them back to safety. He imagined these choices visible like the edges of a slightly spread stack of cards. The optimal choices of an infinite series of alternates, leading to an inevitable conclusion.

"Come on," he said to the woman. He moved off, towing her after him; and she followed like a young child after a parent.

II

He led her toward the flames and the first car. Now that he had perceived the direction in which his actions tended, he thought he would have preferred to have tried to get into the last car where there was no fire to light the scene. However, evidently his perceptions knew better. Keyed to a high emotional pitch now, he felt clearly that it was the first car rather than the last to which they should go.

Hidden in the further dark he came closer to a pair of figures positioning one of the sections. It was this particular pair to which his perceptions had drawn him; and a moment later the perceptions justified their choice, as the two figures moved close together to seal one end of their section to the next—and this in a moment when the two working on the next section had already finished their work and headed back toward the copter.

Chaz let go of the woman and moved softly behind the two figures. For a second, standing just behind them, he hesitated. They were human beings like himself, also human beings on a rescue mission. Then he remembered that these two would consider it their duty to shoot him on sight—and would, with the weapons belted to their suits now for that purpose—if they suspected him of having been one of those exposed to the unsterilized outer environment. It was hard to think like an outlaw. But an outlaw he was now, as much as the saboteur who had wrecked the train.

He stood behind the two and swung the rock overhand, twice. It gave him a hollow feeling inside to see how easily the figures folded to the ground. One by one he dragged them away from the tube and the light of the flames, to where the woman still stood.

She was stirring now, coming out of her shock. It was too dark to see her face except as a gray blur; but she spoke to him.

"What is it . . . ?" she said. "How . . . ?"

Chaz bent over one of the figures and with fumbling haste began to unseal the closure down the front of the suit.

"Get into one of these!" he told her. She hesitated. "Get moving! Do you want to see the Dells again, or don't you?"

The magic effect of the last phrase seemed to reach her. She bent over the other figure and Chaz heard the faint rasp of the seal on its suit being peeled open.

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He forgot her for a moment and merely concentrated on getting into the suit of the limp body at his own feet. He got it off and struggled into it, tucking his catalyst stone into a pocket of his jumpsuit first. Luckily, these sterile suits were all-sized—expandable and contractable, variable in arm- and leg-length. Standing with it on at last, and resealing the closure, he looked once more at the woman and saw she was just stepping into her own suit.

He waited impatiently until she was in and sealed. Then, by gestures, he had her help him drag the two still-unmoving forms back toward the tube. The tube was completed now, and one suited figure was standing farther down by the airlock entrance in its middle section, checking in the other figures who were lined up ready to enter. Leaving the two they had deprived of their suits, Chaz took the arm of the woman and led her circuitously through darkness. They joined the line. It moved slowly forward; and a minute later they, too, filed through the tube airlock. Behind them, the suited figure who had been checking the others in entered, and sealed the inner airlock door.

The other figures were now heading down the tube toward the first railway car. Chaz pushed the woman in her suit ahead of him and followed them. Around them, there was the hissing sound of sterilizing gas being pumped in. It would clean not only the interior of the tube, but the exteriors of their suits—in fact, destroying any rot spores they had not actually inhaled. The hissing ceased before they caught up with the other figures at the end of the tube.

The other figures were standing, waiting, by the roof airlock of the railway car. After a second, there was the distant whir of fans sucking out the gas, then the lighting tubes in the ceiling of the tunnel blinked twice. Two figures next to the airlock began working with it; and to the creak of metal hinges not recently used, it was swung open.

The inner airlock door took a moment longer to open. Then it too yawned wide and the figures began to disappear into the dark interior of the car.

Within, the lights of the car were out. It was a horizontal pit of darkness, filled with moans and crying. The suited figures turned on the headlamps of their helmets.

"Limpet lights!" roared a powerful voice abruptly in Chaz' ears. He started, before realizing that it was the suit intercom he was hearing. There was a pause, but the darkness persisted. The voice came again. *"For God's sake, didn't anyone think to bring limpets? First team back bring half a dozen and stick them around the walls in here. We need lights! All right, let the ones who can walk find their own way out; look for whoever's pinned, hurt, or can't walk."*

The woman had turned her head-

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lamp on in automatic reflex to seeing the lamps go on around her. Chaz reached up to his own helmet, fumbled with thick-gloved fingers, found a toggle by the lamp lens and pushed it. It moved sideways and a beam of light revealed a tangle of harnesses and bodies before him. He reached out, took the glove of the woman again, and started pushing through the tangle toward the rear of the car with her in tow.

They moved until, turning his head, he saw that they were safely screened by the passengers around them from the other suited figures. Then Chaz looked about, playing his helmet light on the crying, struggling mass of passengers.

"All right, all right! Get them moving!" boomed the voice over the intercom on his eardrums.

A small man, apparently unhurt and free of his harness, was among those worming their way toward the open airlock behind Chaz and the woman. Chaz barred his way.

"Lie down," Chaz said; and then realized that even if his voice was somehow coming through the suit's outside speaker, it could not have been heard by the man in this bedlam.

Chaz made motions to the other man and moved around him, taking him by the shoulders. He waved to the woman to take the man's feet. The woman's bulky-suited figure only stood staring at him. Angrily, Chaz gestured; and at last she stooped and picked up the feet. Together, clumsily, they carried the man from the car into the tube.

He had struggled slightly at first on being picked up, then quieted and hung limp and heavy in their grasp. They sweated with him through the crowd to the airlock and into the tube. It was surprisingly empty. The injured near the airlock were blocking the way for those further back who could have walked out under their own power.

Chaz and the woman carried the man down the tube. As they approached the airlock through which they had entered, Chaz stopped and motioned to the woman to put the feet of their burden down.

It took her a moment to understand him, as it had taken her a moment to understand that she was to help pick the man up. Then, she obeyed. Chaz lifted the man upright and gave him a push toward the copter end of the tube. He did not seem to understand at first, any more than the woman had. He stared at them for a second, then tottered off in the direction Chaz had indicated.

The tube about them was empty except for one limping, older man who hardly looked at them as he passed. Chaz let him by, then opened the inner door of the tube airlock and stepped into the lock itself. He motioned the woman in behind him, then closed the inner door on them both.

He took hold of the top end of the seal to his suit and started to take it

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off; but his fingers hesitated. There was a feeling inside him. Not a perceptive feeling of the sort that had brought him this far, but simply an emotional reluctance to leave the two men he had struck outside, to rot and die as he might have rotted and died.

He let go of the seal strip, waved back the woman when she started to accompany him, and opened the outer door of the airlock. The two he had hit were not hard to find. One was now sitting up, dazed, the other was evidently still unconscious.

Chaz helped the dazed one to his feet, took him back through the airlock and pushed him into the corridor, aiming him toward the copter end of the tube. The man stumbled off like a zombie. Chaz went back and dragged the other's limp figure into the lock. With the woman's help, he shoved it into the tube during a moment when no one else was about, then closed the inner door again and began taking off his suit.

The woman imitated him. As soon as they were out of their suits, Chaz once more opened the inner door of the lock a crack and peered out. The man they had carried in from outside was gone.

There were no suited figures in view, but the tube was now full of walking refugees from the first car. None of them paid any attention to Chaz and the woman. Boldly, Chaz led the way out into the crowd that now thronged the tube, and turned to seal the airlock inner door behind them. They followed the others about them into the copter, where attendants were ushering those unhurt through a room with cots into another filled with regular airbus seats, four abreast on either side of an aisle, where the walking refugees from the train were being seated and strapped in.

Chaz stepped back from the woman, pushing her away when she tried automatically to follow him.

"Forget you ever saw me!" he whispered harshly to her, and faded back into the crowd. As he was being strapped into a seat, he saw her ushered to one some three rows ahead of him, on the opposite side of the aisle.

Moments later, a white-suited attendant came by with a clipboard. Chaz slipped his hand into the pocket holding the stone and grasped it tightly.

"Name?" the attendant asked.

Chaz had to clear his throat before he could speak.

"Charles Roumi Sant," he said.

"Address?"

"Wisconsin Dells, Upper Dells 4J537, Bayfors Condominium 131, apartment 1909."

"Good," the attendant noted it. "Was anyone with you on the train?"

Chaz shook his head.

"Do you see anyone here you recognize from the car you were in?"

Chaz' heart beat heavily but steadily. He hesitated, gripping the stone in his pocket. Silence was bad. A

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negative answer was even more dangerous, in case of a later checkup on the rescued passengers.

"There, I think," he said, nodding toward the woman. "That lady there, three up and two to the left."

"Right." The attendant wrote and passed on. Later, Chaz saw him talking to the woman and her head turn slightly, directing the attendant's gaze back toward him. The attendant looked at him, glanced at his clipboard and told her something, then moved ahead.

Chaz sank back into his seat. Clearly, she had also had the sense to identify him as someone she had seen in the first car, thereby confirming his own story. With luck . . . he rubbed his fingers over the stone . . . there would be no more checking; and his name and hers would be buried in the list of those from the first car. But even in the case of a checkup, there was now a report he had been seen in the first car. Even if that car had been completely filled, as the second had been, dead bodies were never removed; and a head count of survivors should not show any extra passengers.

"Hot chocolate, sir?"

Attendants were going up and down the aisle now, offering hot drinks. Like most of those about him Chaz accepted one. It was an unusually rich, real-tasting drink that might have been made with actual chocolate. He sat sipping it, letting relief flow through him with the warmth of the liquid. The stone bulked hard in his pocket and a little fire of triumph burned inside him. The woman dared not talk and neither of the suited workers had had a chance to see the faces of either the woman or himself. After a while the copter took off and about that time, unexpectedly, he fell asleep.

He woke with a start to find the copter already landed at Central Terminal, Wisconsin Dells. It took him a few seconds to remember what he was doing in the aircraft; and when memory did return it brought first incredulity, then alarm. There could have been a sedative in the hot chocolate. If he had been searched while he was unconscious—he clutched hastily at the pocket of his jumpsuit and the hard shape of the rock reassured him. He glanced around for the woman, but could not see her. Most of the other passengers were already up out of their seats and crowding the aisle on their way out.

He joined them, left the copter and went down two levels to the Personal Transit System. An area had been roped off for the survivors of the train wreck and they did not have to wait for cars. He got one almost immediately and programmed it for his condominium in the Upper Dells.

Five minutes later he was in the subbasement lobby of the condominium.

He had hoped to get quietly to his room on the nineteenth level. In

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spite of his sleep on the copter he felt as if he had just put in a nonstop forty-eight-hour day. But a fellow apartment owner was checking her delivery box in the lobby and recognized him. It was Mrs. Alma Doxiels, a stern, tall, fat woman—one of the condominium party-organizers. "Mr. Sant!" she called. "We heard about the 18:15 wreck on the news. Were you—"

Chaz nodded, ducking into an elevator tube that had a platform rising by at the moment. The platform carried him up and away from the continuing sound of her voice.

"Pray penitent, Mr. Sant. Pray pen—"

He reached the nineteenth level and was glad to see that nowhere up and down the narrow, silver-carpeted corridor was anyone in sight. He went hastily to his apartment, stuck his thumb in the lock and strode in, as the apt-comp recognized his print and opened the door. He was two strides inside and the door had clicked closed again behind him, when he saw he was not alone. A girl in a sand-green tweed jumpsuit was seated in lotus position facing the red crystal on the tray in his meditation corner. She turned

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her head sharply at the sound of his entrance and he saw that her face was drawn and her eyes reddened.

For a moment he could not place her. Then he remembered. She was another neighbor, from the sixteenth level. They had met at one of Mrs. Doxiels' gatherings in the condominium party rooms, several months ago—a long evening, the later hours of which had been more than a little blurred as far as Chaz was concerned. His imperfect memory the next morning had been that this particular girl had not shared his blurriness and had even given him to understand that she found it more than a little disgusting in him to be that drunk.

Which did not explain how she happened to be here now in his locked apartment when he himself was away from home. He stared at her, baffled. Then understanding broke through.

"Did I key the lock to your print, that night?" he asked.

She scrambled to her feet and turned to face him. She was a tall girl—he remembered that now—with long brown hair and gray eyes, and a soft, gentle face. Not pretty, not beautiful—attractive, in a way that neither of those two words fitted.

"Yes," she said. "You wouldn't go in unless I let you key it in. I just let you key it to get you to give up and lie down."

"You didn't . . ." he hesitated, "stay?"

"No," she shook her head.

He stood staring at her, knowing what he wanted to ask her but trying to think of some polite way of phrasing it. She solved the problem for him.

"I suppose you wonder what I'm doing here now," she said. "I've never been here since that night."

"That's what I was wondering," he said.

"The news of the train wreck was on the cube," she said. "A lot of people knew it was the train you take. I thought maybe it would help if I meditated here, at your own corner, for you." She tossed her hair back on her shoulders. "That's all."

"I see," Chaz said.

Without thinking he slid his hand into his jumpsuit pocket and brought it out holding the stone. He stepped past her to place it on the tray of sterilized earth next to the flask with the crystal. He turned back to face

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her; and only then realized how odd it must look—what he had just done.

"I was bringing it home . . ." he said. He looked more closely at her face and eyes. "But it's strange. I mean you being here, meditating—"

He broke off, suddenly aware he was talking his way into dangerous areas.

"And you being one of the lucky people to live through the wreck behind sealed doors?" she asked. "Why? Or don't you believe in the aid of meditation?"

"It's not that," he said, slowly. "I'm trying to see the interlock—perceive the chain of connection."

"Oh?" She sounded both relieved and a little annoyed, for no reason he could imagine. "That's right, of course, it's that Heisenbergian perceptive ability you're so concerned with. The one that can qualify you to work on the Pritcher Mass. The one that drives you to drink."

"It doesn't drive me to drink!" he said; and then, hearing the anger in his voice, he wondered why the way she put things should stir him up. "Sometimes I build up a sort of charge—you wouldn't understand. There's no use my explaining."

"No, I don't understand!" she sounded as stirred up as he was. "But I don't see why that should stop you from explaining. In fact, you—"

She checked herself and bit her lip. He stared at her curiously.

"Owe—" he began but the sound of the door-call interrupted him with its soft chime. "Excuse me."

He went to the door and opened it. Outside was the woman from the train.

He stared at her, for a second stopped dead by the shock of seeing her here.

She had somehow found time to change her jumpsuit—it was not impossible that she had stepped into a store on the way here and bought a new one. At any rate, the one she wore now was a gray-pink color—an almost startling shade compared to the usual browns, grays and blacks most people wore; and above it she had even touched up her face with artificial coloring.

She smiled at him.

"We ought to have a talk," she said. "You see, I saw you with the stone; and you still have it, don't you?"

She walked forward past him through the door.

"Yes, I can see it there in your med-corner," she said. "You and I have a lot in common—"

She broke off, staring at the girl from three levels down. Her face stayed fixed in that stare; and abruptly the artificial color on it seemed to stand out, garish and unnatural.

Hastily, Chaz closed the door and swung on her.

"Are you crazy?" he said. "We shouldn't be seen together. Don't you understand that?"

Still staring at the girl, she answered him.

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"I understand you carried away an unsterile object from the wreck," she said, flat-voiced. "I got your name from the man who checked us, on the copter. But you don't know who I am, or anything about me. I can inform on you, any time."

"You'd be informing on yourself at the same time!" he said.

"I don't have anything unsterile that's been brought in from outside," she said. "An anonymous phone call is all it'd take for you. Even if you throw that stone away this minute, the police could find traces of its having been here."

"Oh?" Chaz said grimly. "Maybe not. What's it matter to you anyway? I saved your life—isn't that enough for you?"

"No." Now she did look at him. "My life was nothing to write home about anyway. And for all I know I'm infected with rot right now."

"Don't be crazy!" he said. Once more, he remembered her almost sick fear of being exposed on the train before it had been wrecked. "We were only exposed to the outside for a matter of minutes. The odds are a million to one against any infection."

"There's still that chance," she said. "That's why no one is ever let back in once they've been exposed. With my luck, I've probably got it. You've probably got it, too." She looked once more at the girl. "I suppose you've already infected her."

"Of course not! What're you talking about? What do you want, anyway?" he exploded.

Her eyes came back to him.

"My husband died when we were both twenty-two," she said. "I was left with twins and a new baby. Three children. With ten women to every seven men, who wants a widow with three children? I couldn't even qualify for a job. I had to sit home on basic income and bring my family up. Now my kids are in their teens and they don't care about me. If I'm going to die from the rot in a few weeks, I want some little taste out of life."

She stared directly at him.

"You've got a job, and extra income," she said. "I want everything you can give me." She looked for a last time at the girl. "I was going to suggest something like a partnership; but I see now that wouldn't work."

She turned around and went to the door.

"I'll call you," she said. "And you better answer the call after you get it, if I don't catch you in. I've got nothing to lose."

She opened the door and went out. It clicked closed behind her. Out of the corner of his eye, Chaz saw the girl also moving toward the door.

"Wait!" he said desperately, putting out a hand to stop her. "Wait. Please don't go—"

Then the walls seemed to move in on him, inexorably, and he went spinning off into unconsciousness.

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III

Chaz was having a curious, feverish sort of dream. He was dreaming that the Pritcher Mass was not way out beyond Pluto, but right here on Earth. In fact he had already been at work on the Mass, using his catalyst; and he had startled all the other workers on it with his ability. Already he had made contact with a possible habitable world in a system under a GO star, a hundred and thirty light-years distant. Projecting his consciousness outward from the Mass to that world, he had arrived mentally in an alien city of cartoon-type towers and roadways all leaning at crazy angles. Great snails slid along the roadways, on a thin film of flowing water that clung to every surface, vertical as well as horizontal. An insectile alien like a seven-foot-tall praying mantis had met him and they were talking.

". . . You've got an obligation to answer me," Chaz was arguing.

"Perhaps," said the Mantis. "The fact remains that you're pretty tough-minded. Aggressive."

"You change schools every three or four months all the time you're growing up," said Chaz, angrily—it was the sort of thing his cousins were always throwing at him—"and you'll be tough, too. You know what it's like to fight your way through a fresh roomful of kids every few months? My father was a construction engineer and he was always moving from one job to the next—"

"That's not the point," said the Mantis. "The point is where do you go from here? Think before you answer."

"I know that one," said Chaz. "There's no limit, of course."

"There are very definite limits," replied the Mantis . . .

Consciousness returned. Opening his eyes, Chaz found himself back in his own apartment. He felt clear-headed again, but utterly weak and listless. For a long moment he was puzzled by his view of the room; and then he realized he was staring at its ceiling. He was lying on the floor with his head on the knees of the brown-haired girl. She knelt, supporting his head, her own face bending over him and her long hair falling about her face and his like a privacy curtain. She was stroking his head and singing to herself, so softly he could hardly hear, some nonsense song.

"Gaest thou down tae Chicago, sae fair?
Harp at ye, carp at ye, water and wine.
Think'st thou my name, but once thou art there,
So shalt thou be a true love o' mine.

"Bid'st me I'll build thee a cradle o' withys
Harp at ye, carp at ye . . ."

Music and words had a faintly familiar ring, although the words were not the same as those he had heard with that tune before.

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"Of course," he said, speaking out loud unthinkingly. "*Scarborough Fair.* The spell-song!"

She stopped singing immediately, staring down at him. He got a feeling that he had said the wrong thing, somehow shattering an important moment.

"Is that what it is?" she said in an odd voice. "It's just an old song my mother used to sing. You folded up, all of a sudden. I . . . didn't know what else to do."

"It's a mnemonic," he said. "That was the way medieval so-called witches used to remember the ingredients for a love potion. Parsley, sage, rosemary . . . Wait a minute—" he interrupted himself. "But that wasn't the way you sang it."

"It's only a song," she said. "I didn't know it meant anything. I just had to do something. Are you hurt?"

More concern sounded in her last three words than she might have intended; because she looked away from him as soon as she said it. He felt a tremendous desire not to move at all; but just to keep on lying where he was and let everything else—the sterile areas, the unsterile land, even the Pritcher Mass itself, all go to hell. But, of course, things were not that simple.

With an effort he sat up.

"Hurt?" he said. "No."

He got to his feet. She got to hers.

"You know," he said, "forgive me . . . but I don't seem to be able to remember your name."

"Eileen," she said. "Eileen Mortvain. You're in trouble, aren't you?"

He opened his mouth to deny it—but she had been standing here all the time he had been talking to the woman from the train.

"It looks like it," he said.

"You actually were . . . outside? In the train wreck?"

He nodded.

"So maybe she's right—I've already infected you," he said.

"Oh, no." Her answer was quick. "You couldn't—but that woman can make trouble for you."

"I suppose," he said grimly.

Eileen said nothing, only stood looking at him as if she was waiting for something. He stared back curiously for a moment—and then forgot her, as he remembered the catalyst. He turned back to the corner and picked it up. With it in his hand he felt more sure; and he began to think clearly.

"I'd probably better get out of here," he said.

"I'll help you," said Eileen.

He stared at her again.

"Why?"

She did not color or hesitate; but he got the feeling—perhaps it was something the catalyst had stimulated in him—that the question embarrassed her.

"You're too valuable to be thrown away just because of someone like her," Eileen said. "You're going to do something out on the Pritcher Mass that'll help the human race."

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"How do you know?" Chaz asked.

"You don't remember?" she said. "You talked to me about it for three hours down in the amusement area, that night of the party; and for nearly an hour up here, standing outside your door, before I could get you to go in and go to bed."

The ghost of a memory troubled the back of Chaz' mind. For a moment he almost remembered.

"That's right," he said, frowning. "We sat in the corner booth near the swimming pool; and you kept handing me drinks—"

"You got your own drinks—too many of them!" she said, swiftly. "Anyway . . . you told me what it was you hoped to do out on the Mass, when you got there. That's why I was in here praying for you, just now. I didn't want to see you wasted after what you said you'd planned to do on the Mass."

"Planned?" he said. "I'm only trying to get on the staff out there, because it's someplace things are happening—not like here on Earth."

She looked at him brilliantly, but did not answer. He gave the matter up, turning to the drawers of his built-in dresser and opening them one by one to get any small personal articles that could be stuffed in the pocket of a jumpsuit. Clothes and toilet articles were no problem. He could pick those up as he needed them in any twenty-four-hour store.

"Maybe if she comes back a few times," he said, "and finds me gone, she'll give up. It's worth the chance, anyway."

He finished stuffing his pockets, turned and opened the door to the apartment.

"Here we go," he said, ushering Eileen out into the corridor and following her. He closed the door behind him, then turned to face her, suddenly feeling a little awkward. "Well . . . good-bye. And thanks for thinking of me, when you heard about the train wreck."

"Not good-bye," she said. "I told you I was going to help you. Where do you think you'll go now?"

"I'll get a PRT car and make up my mind as I go."

"And what if she's already gone to the police?" Eileen asked. "The police can check and find the record of your credit card. Every credit card used on the Personal Rapid Transit is recorded, you know that!"

"Then I'll walk to the nearest auto-hire—" he broke off.

"Then you'll have to use your credit card there, too, won't you? You can't rent a u-drive without a credit charge," she said. "There's no regular way you can get out of the Dells without leaving a trail of credit records for Central Computer. I tell you, let me help you. I can get you out another way."

He gazed at her for a long moment, then suddenly the humor of the situation struck him. He laughed.

"All right," he said. "What kind of route have you got up your sleeve?"

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"I'll show you," she said. "We'll need help, though. Come down to my apartment first."

He followed her as they took an elevator disc down to her level. She led the way to an apartment door and pressed her right thumb on the sensitized plate. Reacting to the pattern of her thumbprint, the lock snicked back and the door swung open. Glancing in, Chaz saw an apartment like his own and everyone else's in this area of the Dells. Then a chittering, whining noise drew his attention to a corner of the room behind an extruded sofa; and a strange creature came out into the center of the apartment.

It was a black-furred animal which seemed to grow as it emerged; until finally in the center of the room it was the size of a middling-sized dog, only much more heavily furred. It had a long black bushy tail, a sharp muzzle, and eyes that glittered with what seemed to be more intelligence than a nonhuman creature should have. Eileen was talking to it in a strange mutter of syllables the moment she opened the door; and when she stopped the creature answered with its own chittering, whining and near-barking in something that had all the cadence of a human reply.

"My pet," said Eileen, turning to Chaz. "He's a wolverine. I call him Tillicum."

"Tillicum?" said Chaz, as jolted by the name as the identity of the species to which Eileen's pet belonged. He had never expected to hear of, much less see, a wolverine in the sterile areas outside of a zoo. "You call him Tillicum?"

"Yes. Why?" Eileen was staring at him penetratingly again.

"No reason," said Chaz. "It's just that the name means 'friend' in the North Pacific Coast Indian dialects; and I'd always heard wolverines weren't all that friendly."

"You know Indian languages?" Eileen asked.

"No," said Chaz. "It's just that my head's cluttered like an old-fashioned attic, with all sorts of information about this and that. Like that song you were singing to the tune of *Scarborough Fair,* back in my apartment—" he broke off. "It doesn't matter. You mean it was Tillicum you said we needed?"

"Yes," said Eileen. She took a half-size limpet light and some other small items from one of the drawers built into the wall beside her, then turned. "Come on."

She led the way out of the apartment. This time it was Chaz who followed, Tillicum at his heels.

"Where are we going?" Chaz asked as they started off down the corridor, only to stop and turn in, short of the elevator tubes, through the door leading to the emergency stairs.

"To the basement," said Eileen. She did not offer to say anything more; and he followed her down the green-painted concrete steps of the stairwell that echoed to the sound of

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their footfalls, but not to those of Tillicum, padding noiselessly beside them.

The walk down seemed longer than Chaz had expected. He found himself trying to think when he had last traveled up or down in a building by any way other than elevator—and found he could not remember doing so since he had been a boy. Finally, however, they came to a point where the stairs ended. A heavy fire door with a bar latch faced them. Eileen leaned on it, and they went through.

They came out into a small room with the same bare, green-painted cement walls, floor and ceiling. Another door stood in the wall to their right, with a ventilator grille to its left about six feet off the floor. Warm air poured noiselessly from the grille; and Chaz found he welcomed it. The starkness of the concrete surroundings made the room seem chilly, whether it was really so or not.

Ignoring the door, which was labeled with a sign *No Admittance; Authorized Personnel Only* just above the small, silver square of the lock, Eileen stepped to the ventilator shaft and took from her pocket a rectangular brown box small enough to be hidden in her fist. She pressed this to each corner of the ventilator grille. The grille fell off, revealing the small, square black entrance to the ventilating duct.

"Why not open the door, instead, if you've got a full-band vibration key?" Chaz asked, curiously.

"Because the cycle and pitch on that door lock is changed every week by remote control from Central Computer," she answered without turning her head. "The ventilator fastenings are standard. Central doesn't worry about it because it's too small for anyone but a child to get into; and just inside there's a set of weighted bars too heavy for a child to lift."

"Then we're out of luck on two counts," said Chaz. "No child, and a child would be too weak, anyhow."

"Tillicum can do it," she said calmly.

She looked at the wolverine. Tillicum leaped the full six feet to the duct entrance with surprising ease and vanished inside it. Eileen turned from the opening back to Chaz.

"It'll take a few minutes," she said.

"Tillicum can get inside that way," Chaz said. "But how about us?"

"He'll open the door for us. It's not locked from the inside," Eileen said.

"You mean," Chaz said, "he can handle ordinary doorknobs, or whatever they've got there on the other side?"

"Yes," she said.

Chaz fell into a doubtful silence. But a moment later the door swung open in front of them; and Tillicum looked up at them, red-lined mouth half open as if in laughter.

"Come on," said Eileen.

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They went in through the door, and down a corridor perhaps ten meters in length to where another door stood ajar, held that way by a large cardboard carton that had been pushed between it and the jamb. Chaz looked thoughtfully from the carton to Tillicum.

Through the second door they came to a wide, brightly lit tunnel, down the center of which ran a broad conveyer belt moving at not much more than a walking speed. Where they stood was a broad place in the tunnel, nearly filled with some sort of automatic machinery, half of which was accepting refuse from the condominium above, packaging it in cartons and sending it out on the conveyer belt, while the other half accepted cartons from those on the belt, broke them open and dispatched the merchandise, food, or other contents within them upstairs to the apartments to which they were addressed. Chaz looked at the machinery curiously. Everybody knew about this delivery system, but he, like most, had never seen it in action.

"Good," he said to Eileen. "I ride the conveyer down to Central Processing, sneak upstairs to the Transportation Center and I ought to be able to manage to get on a night freight train for Chicago without trouble. Once in Chicago, I can hide out until I can qualify for the Mass."

"You're that sure you can qualify?" she said.

He looked at her, a little surprised.

"I thought you believed in my working on the Mass," he answered. "As a matter of fact," he felt in his pocket for the catalyst and found it still safely there, "I am that sure."

"All right," she said, "but you'll never make it to Chicago on your own. For one thing, there're inspectors patrolling this whole conveyer system all the time." She turned to the wolverine. "Tillicum!"

Tillicum leaped up on top of the machine which was filling empty cartons with refuse from the apartments above. Reaching down with one paw and surprising strength, he flipped a large, empty carton from the machine to the floor, then jumped back down to join Eileen and Chaz.

Eileen had already produced a small self-powered knife; it hummed cheerfully as its vibrating blade slit the carton open vertically. She cut the top and bottom surfaces as well as the one vertical face of the carton; and then, with Tillicum humping forward to help, spread the container open like an antique wardrobe trunk.

"Yes," she said, peering into its empty interior. "Plenty of space . . . Tillicum!"

The wolverine, reacting as if he could read her mind, pushed the carton together again and shoved it across the floor to the conveyer belt itself. Then, taking it between both forelegs almost like a human, he jerked it upward until it tumbled onto the belt and began to be carried away.

Tillicum leaped after it, and stuck

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his claws in the carton, setting it upright once more.

"Come on. Hurry!" said Eileen, jumping up on the belt. Chaz stared for a split second, then followed her. She was already walking down the belt toward Tillicum and the carton. When he caught up with them, she had opened the carton along her cut, and was already crawling inside.

"Come on!" she said.

Chaz frowned, but followed her. A second later, Tillicum slid in beside them and, hooking his claws in the carton, pulled the carton closed. It was a tight fit with all three of them, but the box-shape finally closed except for a crack and they were in almost total darkness. There was a faint sucking sound and a second later illumination filled the carton's interior from the limpet light Eileen had just attached to the side above her head.

In its white glare Chaz found himself and Eileen sitting facing each other with their knees almost touching. Tillicum was somehow curled up around their legs and under those knees.

"But why do you want to come with me?" Chaz said.

"I told you you couldn't get out on your own," she answered. "I'm taking you someplace safe where you can wait until I can arrange to get you away."

"You're taking a chance, too," he reminded her. "Remember I've been outside? These are pretty close quarters to avoid being infected from me."

"I'm perfectly safe!" she said impatiently. "Never mind that—" She broke off. "What are you going 'hm-m-m' about?"

Chaz had not realized he had made any audible sound.

"Nothing," he said. "Just, your name—never mind. What was it you were going to say?"

"I was saying, never mind that. We're as close to being safe from inspectors in this carton as we can be. Now's the chance to stop and think about covering your tracks. Do you have anybody who might come looking for you when you don't show up?"

"The office will probably call, if I don't show up there tomorrow morning," he said. "I've qualified for work in the Records Research Section at the Illinois State Center."

"I know," Eileen said. "You told me, that night in the amusement rooms. It's a pretty good job nowadays, with ten people waiting for every opening there is, just to keep from sitting on their hands doing nothing."

"It's the kind of work where that cluttered memory attic in my head comes in useful," he said. "But I don't think they'll miss me too much, even if they call a couple of times and get no answer. As you say, there's too many other people waiting to take my place."

"Good," said Eileen. "How about relatives? No relatives?"

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"I didn't tell you that?" he asked, a little dryly.

"Oh, that's right. Your cousins, and your aunt," she said. "You did mention them. But I think you said you didn't get along with them."

"I don't," he said. "They took me in to raise after my father died, and my mother had been dead three years. My uncle was all right—as long as he lived—but my aunt and their kids were poisonous."

"So, they wouldn't wonder about you if you disappeared suddenly?"

"No," said Chaz. He reached into his pocket and took a firm grip on the stony surface of the catalyst. "And now that I've set your mind at ease about that, how about you doing the same for me? Don't you think it's safe now to tell me where you're taking me, and who it is you're delivering me to?"

IV

She did not answer for a long moment, but sat staring at him in the brilliant light from the limpet. In spite of the current of air that the belt's motion pushed through the narrow gap left where the cut side and top of the carton were not completely joined together, these close quarters were becoming stuffy. Chaz thought he caught a faint, skunky odor from the wolverine at their feet.

"What are you talking about?" she said at last. "Deliver you? To whom?"

"It's just a guess," he answered, still holding on to the rock. In one corner of his thoughts was the plan that if the wolverine turned on him, he would try to shove the stone down its throat—this would at least give him some kind of fighting chance. "But I don't think it's too bad a one. I mentioned this cluttered attic mind of mine. Match that up to a talent for chain-perception, and too many things about this situation seem to hook together."

"For example?" Her face was set and her voice was brittle. When he did not answer immediately, she went on. "Who am I supposed to be delivering you to?"

"I don't know," he said. "The Citadel?"

The air hissed suddenly between her teeth on a sharp intake of breath.

"You're saying I'm connected with the criminal underworld?" she snapped. "What gives you the right—who do you think I am, anyway?"

"A Satanist?" he said, questioningly.

She made another faint breathing noise; but this time it was the sound of the breath going out of her as if knocked out by a sudden, unexpected blow. She stared at him with eyes that were abruptly round with disbelief.

"Can you read minds?" she said faintly.

He shook his head.

"No," he said, "I don't pretend to any paranormal talents—except for chain-perception. You ought to

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know there's no such thing as true telepaths, anyway."

"There's other ways to know things," she said, still a little obscurely. "What makes you say I'm a Satanist?"

"A lot of little things," he said. "Your name, for one."

"My name?"

"Mortvain," he said. "If you were a French-speaking knight in the middle ages, with that as a motto under the heraldic achievement on your shield, I'd be pretty sure you were defying death."

"Death?" She shook her head. "Me? I defy death?"

"Don't you?" he answered. "At least twice you've told me that you're not afraid of my infecting you with rot, in spite of the fact you know I've been exposed; and we're jammed in here so close now that you could hardly help getting spores from my breath if I've already been infected."

"I just meant . . . I don't believe you could have been infected," she said. "A short time outside like that."

"How do you know how long I was outside?"

"Well, it couldn't have been long. Anyway, what's that got to do with my name?"

"I think you already know," he said. "Mortvain. Mortvain, from the Old French *mort,* meaning 'death' and *en vein*—meaning 'without success', or perhaps 'in a blasphemous manner'. Freely translated, your name could mean 'I defy death' or 'I blaspheme against death'."

"That's nonsense," the girl said.

"You're saying, then, that you don't hold with Satanist beliefs?" he said, watching her closely.

"I'm not—there's no reason why I should," she said. "Naturally, I'm not against someone else's pattern of ethos-involvement, any more than anyone else is. But that doesn't mean I've got anything to do with Satanists. Only—I'm not on trial. I don't have to assure you of anything."

"Of course not," Chaz said. "But it's a fact there are people among the Satanists who consider themselves witches. And these witches recite spells, pray rather than meditate, have animals they consider familiars and believe that they can defy death itself as long as they are in love with a particular concept of evil. Also, as a matter of fact, they actually are supposed to be involved with organized crime."

"No," she said, her eyes half-closed as if he was questioning her under duress.

"No what?" he asked. "No, you're not involved with organized crime? Or no, you're not a witch?"

Her eyes opened at that. She even smiled faintly.

"Have you stopped beating your wife?" she murmured. "What kind of a choice are you giving me?"

Her smile made him smile back in spite of himself. But he stuck to the point.

"All right," he said. "I put the question badly. Bluntly—are you someone who thinks she's a witch?"

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"And if I was?" she said. "What difference would it make? I'm helping you anyway."

"Or delivering me to someone."

"No!" she said, suddenly and violently. "I'd never turn you over, to anyone. I'm no criminal—and no Satanist!" The violence leaked out of her unexpectedly; and she looked at him again squarely. "But, all right. You're not wrong about one thing. I am a witch. Only it's pretty plain you don't know anything about what that means."

"I thought I'd just shown you I know quite a bit," Chaz said.

"And they say prejudice is dead!" Her voice was bitter. "Haven't you ever learned that witches always were people with paranormal talents, who had no place else to go in the past, but into devil-worshiping communities? You'd be pretty upset if I called *you* a Satanist, just because you believe you've got a talent for Heisenbergian chain-perception."

Chaz had to admit to himself that this was true.

"You turned up pretty conveniently right after the wreck and before the woman came, though," he said.

"I've got paranormal talents too, of course!" she flared. "Why do you think I concern myself with you? Because we're both different. We're both on the outside, shut away from ordinary people, looking in. That's why it mattered to me what happened to you!"

"I don't consider myself on the outside looking in," he said, obscurely angry.

"Oh, no?" her voice was scornful. She went on as if reciting from a dossier. "Charles Roumi Sant. Always in trouble in primary and secondary schools. Anti-Neopuritanist. Candidate for degrees in nearly a dozen fields before he managed to graduate in System Patterns."

"You know a lot about me," he said, grimly.

"I took the trouble to find out, after that evening down in the party rooms," she said. "The trouble with you, Charles Roumi Sant, is that you think your own talents are real; but mine have to be some kind of fake, or part of some con game."

"No—" Chaz began and then his conscience tripped him up before he got any farther. Once more he had to admit that she was right.

"This is the twenty-first century," he said instead. "Everybody knows there's no such thing as the supernatural, or supernatural powers."

"Paranormal, I said. Not supernatural!" she retorted. "Just like you, and yours. There's that prejudice I was talking about. Because someone like me uses the old word 'witch' you think she's a charlatan. Well, I'm not. I was the one who saved you from that train wreck, whether you know it or not!"

Her words seemed to trigger off something like a soundless explosion in his head.

"No, you didn't!" he said. "I saved

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myself. I did any saving that was done!"

The wolverine snarled lightly under his knees; but the warning was not needed. As soon as the words were out of his mouth, he had felt the backwash of his own sudden fury and been jarred by it. But not jarred to the point of taking back what he had just said.

"All right," he went on in a more level voice. "I'm not going to fly off the handle. But don't fool yourself. I got myself out of that train wreck situation by using chain-perception; and I know how I did it, every step of the way. I used—" he broke off, on the point of talking about the catalyst. "Never mind. You were going to tell me what witches were really like. How did someone like you end up as one?"

"I didn't end up!" she said. "I was born one. Just as you were born the way *you* are. My mother and grandmother were witches, and thought of themselves as witches. Only, by the time I came along, psychology knew enough about the phenomenon so that I could separate the superstitions about us from the reality. Of course, I knew all about the superstitions. I heard enough about them from the older people. In fact, when I was a little girl, I believed them, too; until I learned better in school and university."

"All right," Chaz said again. Emotion had been strong in her voice; and that had gotten through to him more deeply than the actual words she had been saying. "Most of the old ideas about witches are superstition. What's real, then?"

"The basis," she said. "We actually can do things. But we have to be emotionally convinced we can do them before our paranormal abilities will work. In fact, that's a sort of basic law for all people with such abilities. Stop and think for a minute. Do you think you could use this chain-perception of yours if you suddenly started doubting you could?"

"Hm-m-m. No," said Chaz, suddenly reminded of what Waka had said about most candidates for work on the Pritcher Mass being self-convinced about their abilities.

"Of course not," Eileen went on. "It's like anything above the normal. The creative frenzy of an artist. The way an athlete surpasses himself under pressure. It takes a complete, whole-hearted commitment to the idea that you can do what you want to do . . ."

She went on talking; but Chaz' attention slipped slightly from what she was saying. He had just become aware that the vibration of the belt beneath them had gradually increased, and the air coming through the crack in the carton was now a breeze moving fast enough to cause a whistle. Holding up a hand to interrupt Eileen, he leaned over to put his eye to the crack and look outside.

What he saw were concrete walls now flickering past rapidly. The belt had increased its speed several times

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over. Just how fast they were going now, he had no way to estimate; but it was certainly enough that any attempt to get off the belt on to the narrow service walkway running along one of its sides would mean serious injury or even death. He brought his head back and looked at Eileen in the glare of the limpet light.

"Where are we?" he asked.

"Getting close to Central Distributing," she said. "Almost to the place where we get off."

"Get off?"

"You'll see," she said. He thought, but could not be sure, that he caught the gleam of a secret satisfaction in her eyes at seeing him sweat out the descent from the belt, without knowing how it was to be done. He clamped his own jaws shut; and for the next few minutes, neither of them said anything.

Abruptly, she and Tillicum moved together, spreading the carton wide open, so that they sat exposed on the belt. Eileen rose from a sitting position into a crouch.

"Get ready," she said. "There'll be an overflow belt swinging in alongside this one in a few seconds. When it's parallel, get ready to jump."

"At this speed?" Chaz said. But she did not answer. He got into a crouching position himself; and a moment or two later saw a dark spot on the right side of the tunnel up ahead, which grew rapidly to reveal itself as the mouth of a connecting tunnel. A belt ran through this, too, curving in as Eileen had said, to parallel the one they were on. But it was several feet below the surface of their present carrier.

"Ready . . ." said Eileen. They flashed toward the point where the two belts ran side by side. "*Now!*"

Chaz jumped, a little behind Eileen. Behind him, out of the corner of his eye, he could see Tillicum flying through the air as gracefully as a cat. Then they hit.

He had braced himself against the landing. But it was like coming down onto a barely-filled waterbed. There was none of the impact Chaz had expected; and no tendency whatever for the momentum they carried from the former belt to send them sliding or rolling.

It was then he realized that this second belt was also moving. Naturally, he thought, disgusted at his own lack of imagination, the speeds of the two belts had been matched—or almost—at the point where they changed over. They could possibly even have stood up to make the transfer . . .

No, on second thought standing up might not have been so wise. Because, Chaz realized even as he was thinking this, the second belt was decelerating sharply. It had curved away from the main belt into a further tunnel; and now he saw the end of that tunnel, expanded into a fair-sized room half-filled with sorting tables leading to smaller belts disappearing off into further tunnel ports.

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"This is a secondary sorting center—for when the main belt gets overloaded," Eileen was saying; and then they reached the end of the belt where it turned down abruptly to disappear into a slot in the floor. It tumbled them gently onto the floor at a good deal less than slow walking speed.

"A variable-speed belt," said Chaz, marveling, picking himself up. "How do they do that—"

He broke off, having glanced back along the belt and seen how they did that. Every five meters or so they had been passed on from one belt to another, each traveling at a slightly slower speed.

"However," Eileen was saying, now back on her feet also, "in summer, like this, it never gets overloaded. After holidays, when a lot of people come back to their apartments at once, is the only time you can be sure to find it working. So it's pretty safe here right now."

"I'm supposed to hole up here?" Chaz asked, looking around him.

"No," said Eileen. "Come along."

She led the way, Tillicum beside her, past the sorting tables toward two doors, one marked *Men* and one *Women*. She beckoned Chaz to follow and led him through the door marked *Women*. The first room was a carpeted lounge. Within, along one wall was a long mirror, coming to within two feet of the floor and an equal distance from the three-meter-high ceiling. Eileen touched the two bottom corners of the mirror lightly with the tip of her index finger, stood back and clapped her hands, once. The mirror pivoted about its midpoint, one end retreating into the wall, the other swinging out into the lounge to reveal a hidden room, about the size of the lounge. Eileen stepped over the low ledge of wall into this room. Tillicum followed with an easy leap, and Chaz stepped over after the wolverine.

"Stand clear," said Eileen. Chaz moved aside and she touched the mirror. It swung back into place, shutting them in without visible exits.

Chaz looked around. There was a dais at one end of the room, with an elaborate, high-backed chair of what looked like carved wood upon it. Folding chairs were scattered about the gray concrete floor, apart from the dais.

"I thought you said you weren't a Satanist," he said to Eileen. "Isn't this one of their secret temples?"

"No, it isn't," she said. "As a matter of fact, it's a witches' hole. But I don't expect you to know the difference."

His conscience bit him—hard.

"I'm sorry," he said. "I really do appreciate what you're trying to do for me. I'm not trying to needle you. It just comes out that way, sometimes."

"I've noticed that," she retorted, then softened in her turn. "All right. Never mind. We might as well sit down now. We have to wait for someone."

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"Who?" he said. "Or should I ask?"

"Of course you should ask," she said. "It's someone we call the Gray Man."

"A warlock?"

"Not a warlock. A male witch!" she said. "A warlock's—well, never mind. Actually, the old distinctions don't matter. He's just another one of us with paranormal talents; but in his case, he stands in a position which links the witch-group to the non-witch-group."

Chaz frowned.

"I don't follow you," he said.

"All right, then," Eileen answered. "He's our link with the criminal underworld, the Citadel—I know, I told you we didn't have anything to do with the Citadel!" she added swiftly. "We don't, we full witches. But the connection has always been there, and sometimes it comes in useful for us. Like now. The Citadel can hide you until you can qualify for the Pritcher Mass. I can't."

"What if this Gray Man doesn't go along with you?" Chaz asked, feeling for the rock in his pocket instinctively.

"He will," her eyes flashed. "He gives away half his strength by making himself a servant of non-witches. Any one of us full witches is stronger than he is. I can make him do anything I want."

"*Anything?*" said a voice that seemed to echo strangely about them, from no particular individual source. Chaz glanced in several directions before realizing that the ornate chair on the dais was now occupied. The slim, wide-shouldered figure sitting in it was dressed in a tight-fitting gray jumpsuit; but it also wore gray gloves and shoes, and its head and neck were completely covered by an elastic gray mask that showed a bald, lashless, expressionless face of the sort that might be found on an old-fashioned department store dummy. The figure looked small; but the size of the chair might have contributed to that. In addition, Chaz found, there seemed to be some distortion in the air about the gray figure, so that it was hard to keep it in focus for more than a few seconds without blinking.

"Anything I really want and need!" Eileen was answering, fiercely. "Are you challenging me?"

"Sister—dear sister—" said the voice that seemed to come from all around them as the lips of the mask stayed motionless, "let's not argue. Of course I'm happy to do what any one of you want. What is it this time?"

"I want this man here kept safe from the law until he can qualify for work on the Pritcher Mass. He'll need to stay in the Chicago area."

"Just that? Is that all, sister?" The tone of the omnidirectional voice was ironic.

"That'll do for now," her voice was hard.

"It could be done. Of course," said the Gray Man. "I can do anything,

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let alone that. But should I? You've never been kind to me like some of the others, sister."

"You know I don't have to be!" Eileen snapped. "I'm not one of the old ones who thinks she needs you. There's no covenant between us. So don't try to play one of your little games with me. You get paid by the Citadel for what we do for you when we feel like it. But you do what we say because you've got no choice."

"No choice? How sad."

"Stop wasting time!" said Eileen. "I've got to get back to my apartment. Have you got someplace in mind you can keep Mr. Sant, here, until he passes his Pritcher Mass test?"

"Oh yes," said the Gray Man. "I've got a lovely place. It's in a big building but he won't mind that. It's very quiet and very dark, but he won't mind that. In fact, after awhile he won't mind anything."

Eileen stared at him for a long second.

"Have you gone completely insane?" she asked finally, in a low, cold voice. "Or are you actually challenging me?"

"Challenging you? Oh no, sister," said the Gray Man, spreading his hands. "I've just got no choice. It's the Citadel that wants Mr. Sant out of the way; and he wasn't cooperative enough to stay nicely outside where the train wreck put him. Of course, his coming back in put him on the wrong side of the law and that makes it easier for us."

"*Us?* You class yourself all the way with criminals, now?" said Eileen. "Not that it matters. What's The Citadel got to do with him?"

"That, they don't tell me, sister. They only told me to bring him to them—just as soon as you brought him to me. And so I must, now."

"Must? I've had enough of this!" Eileen said. "It's time you remembered who you're talking to. Tillicum—"

The wolverine moved—and froze again, as Eileen suddenly flung out her hand to stop him. A hand laser had appeared in one of the gray gloves of the Gray Man on the dais. Holding the weapon, the Gray Man threw back his head; and his laughter beat upon them from all sides.

"Sister! Dear sister!" he said. "Do you think I'd risk anything like this unless I knew you were powerless? Stop and think. Has anything worked for you lately? Has even the smallest work of the Great Art succeeded for you?"

"What are you talking about?" said Eileen.

"You know. You know!" the Gray Man crowed like a delighted baby. "You're in *love*, sister dear. You've done what no witch can ever do, and get away with. You fell in love and so you've lost your power!"

"I told you I wasn't one of the old ones!" said Eileen, furiously. "I know what my powers are—natural paranormal talents. I can't lose them

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by falling in love, any more than I can lose an arm or a leg." Eileen glared at him.

"Of course you can't! Oh, of course!" crowed the Gray Man. "You can't lose them—but you can't use them. Because you believed the old tales when you were a child; and the primitive part of your mind can't get rid of that belief, can it? Of course love didn't take away your talents, sister dear. But it gave you a psychological block that keeps you from using them. Doesn't it annoy you, sister, to—"

Eileen stepped back a step and threw up her hands, crossing the first two fingers of the left hand over the first two fingers of the right, before her face, so that she looked through the square these fingers made, at the Gray Man. She spoke swiftly:

"Light curses dark, and dark curses gray.

A tree, a rock, a shrieking jay,
Will hear you moan at break of day.

Pater sonris maleorum . . ."

"No use! No use!" shouted the Gray Man, rolling around in his seat in laughter. "Words, that's all you've got left now. Words! Now *I'll* take the man."

He pointed a forefinger of his free hand at Chaz; and without warning sound and sight were cut off. Chaz found himself elsewhere.

V

His first thought was that the transfer had been immediate. But then the feeling followed that perhaps unconsciousness and some time had intervened between the last thing he remembered and this.

This was nothingness. A dark, solid and endless, encompassed him. He seemed either fixed in it like the corpse of a fly in amber, or afloat in its infinite regions. He could feel nothing on his skin, not even warmth or coolness. He could not even be sure he breathed.

About him there was absolute silence—or was there? He became aware then of a slow, very slow, sound repeated regularly. He was baffled for a moment, and then he recognized it as the beating of his own heart. For the first time a suspicion woke in his mind. He made a deliberate effort to turn his head to the right, then to the left. There was no way for him to tell that his head had actually moved; but, as he made the effort, he heard a grating sound that seemed to come from behind him. He knew then what his situation was, even if his knowing was little help.

The grating sound was the noise of his neck vertebrae in movement. He must be hearing it by sound-conduction through the bones of his spine and skull. So slight a sound could only be audible if he was in a total isolation chamber of some sort, possibly afloat in some liquid me-

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dium, restrained so that he could not feel the restraints; but held securely enough so that he could not free himself. The isolation chamber was an ancient sort of device, dating back into the twentieth century, but not therefore a harmless one. Enough hours in this situation with all sensory input cut off and he could lose his memory. Or his mind could become a blank page on which his captors could impress any belief they wanted.

He strained to reach out with both arms and legs, to touch something—*anything. But he felt nothing.* He could not even tell for sure if his arms and legs had obeyed him, except by the faint sound of creaking muscles that reached his ears. He stopped trying to touch his surroundings and simply lay there. It was easiest just to lie still . . .

He caught himself drifting off into sleep and struggled back to awareness on the body adrenaline released by his own alarm. He did not dare sleep. Somehow he had to stay awake and find some way of giving dimension to his situation. If he only had some way of simply measuring time, he could use that as a mental anchor. He thought suddenly of his heartbeats and began to count them. One . . . two . . . three . . . His normal pulse, he knew, was around sixty-five beats per minute in a resting state. Say that in this situation it was even slower, perhaps sixty a minute only. Sixty . . . sixty-one. . . .

It was no use. He began to get the impression that he was no longer hanging motionless; but sliding off down some vast, lightless slope that went on to infinity. Faster he slid, and faster. He was rocketing through the darkness now, without feeling a thing, headed out toward the very end of the universe . . .

He was far off in space, sliding beyond all galaxies at some immeasurable multiple of the speed of light, and accelerating still. He was being carried along by a current, a swift *river of nothingness cutting through* the stationary nothingness that was the rest of the infinite. He was alone . . . no, he was not completely alone. Two bright spots were barely visible, far off on either side of the invisible rushing river that carried him forward so swiftly. The spots grew into shapes and came closer, shining with their own light in the darkness, until they placed him on either side of the river, traveling under their own power, but keeping level with him. They were two he had seen before. On his left was one of the massive snails he had dreamed about when he had been unconscious in his apartment, the other was the insectile, mantis-like alien to whom he had talked in the same dream.

"Help me," he said to the Mantis, now.

"Sorry," said the Mantis. "Ethics doesn't obligate us that far."

He looked over at the Snail.

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"Help me!" he said to the Snail. But the Snail neither answered nor showed any reaction, merely kept moving level with him.

"There's no point talking to him," said the Mantis. "When you talk to me, you talk to him, anyway. And when I talk to you, I tell you what he thinks, as well."

"Why won't one of you help me?" Chaz said, desperately. "All you have to do is pull me out of this river. Just pull me to the side a little and I can stop."

"True," said the Mantis. "But among other ethical laws, the one of hands-off forbids us to do that. You have to get a member of the union that unplugged you to plug you back in again. It's a breach of our own contract if we do it."

The two of them began to angle off from him, dwindling into the blackness.

"Wait!" Chaz called desperately. "What union is it that I have to get to plug me in again? Tell me the name of the union!"

"There isn't any!" floated back the tiny voice of the now-distant Mantis. "It hasn't been organized yet."

They disappeared, like pinpoints of light gone out. Left alone, accelerating on the river of darkness, Chaz felt his consciousness dwindling as the snail and mantis had dwindled, shrinking down to a candle-point, to a spark, almost ready to go out.

If only he had his catalyst, he thought. If he could apply chain-perception to this situation maybe he could find a way out, even from this.

If he had some alternatives to choose between . . . wait. He could still choose to turn his head, or not to turn his head. He could choose to move his arms or legs or not to move them. He could choose to move his right arm or his left . . .

That was no use, either. He needed the catalyst, if only for a few seconds. He tried to imagine the stony feel of it in his hand. Imagine, he told himself. Imagine it.

He concentrated. He could almost feel the rock fitting into his grip. It was about the size of a small orange, he remembered. Its surface was rough. One small lump on its surface nestled almost comfortably between the bases of his index and second finger when his hand was closed around the rock. The surface the little finger had rested on was almost planar. A graininess irritated the heel of his hand as he tightened his grip on it. It was just this heavy . . .

He could *feel* it.

He could feel it there in his right hand now, as real as it had ever felt in his grasp.

. . . And he was no longer sliding down the endless river in darkness. He was back, afloat or whatever once more in the isolation chamber, as he had been when he first awoke.

The warm flood of a tremendous feeling of triumph washed through him. He had his catalyst. He could do anything now. He held it. He

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could feel it. Why shouldn't he be able to see it as well?

He lifted his right hand toward his face. There was no way of telling whether he actually held it before his eyes or not; but he felt more strongly every second that he did. It was there. If it was there, he could see it.

He stared into the darkness.

Naturally, he told himself, he would not just suddenly see it, all at once. But perhaps gradually . . . he stared into blackness and thought he saw a faint pin-prick of light, such as the Snail and the Mantis had made, when they had first appeared, and just before disappearing. He concentrated on it, willing it to come nearer as they had come nearer. Slowly, painfully, it grew in brightness and size. It came closer . . .

It came to him. He held the catalyst before his face and saw it plainly, every slant and angle and color in it. As he stared at it, it blurred and changed form.

He looked down a maze of alternate choices, like the edges of cards in a deck slightly spread out. Plainly, he read the message in them. Of course! Whoever had put him in this had not intended to leave him here forever; only until his sanity was sufficiently softened or dissolved. Someone would be coming to take him out, eventually. Until that time, he and the catalyst would find his mind some sanity-saving work to do. Of course. He almost chuckled to himself. In the infinity of darkness they could even create and build themselves a Pritcher Mass of their own, right here on Earth as it had been in his dream.

They went to work . . . and a Pritcher Mass began to take form . . .

Like an explosion, light blared suddenly against Chaz' closed eyelids, and the nearly completed Pritcher Mass was swept away, back into a corner of his mind. He lay limply with eyes still closed; and felt hands moving about him, heard the splash of liquid and the sound of buckles being unbuckled. There were faint pulls on his arms and legs.

"Right," a man's voice said distantly. "Lift, now."

Chaz felt himself raised by hands gripping his shoulders and legs, moved through a small arc of distance and laid on a surface which, after the isolation chamber and its lack of physical sensation, seemed shockingly hard. He kept his eyes closed. Hands moved about him, stripping some kind of helmet off his head and pulling off him tight-fitting, elastic clothing.

With the clothing off, warm air wrapped his whole body. After the silence of the chamber, every sound that was made seemed to roar in his ears. He heard the two that were working on him breathing like elephants. He heard the scrape of their feet on the floor as they turned and walked away from him, to begin sloshing and clanking noises back where he had been.

He opened his eyes and turned his head.

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He lay on a white-sheeted bed in what appeared to be a hospital room with a blue curtain drawn across its transparent front wall. Two men, both in white coats, were standing with their back to him, working on a black, rectangular box the size of two coffins placed one on top of the other. For a second the light dazzled Chaz' eyes; and then his vision settled down.

He swung his legs over the side of the bed, stood up and took one step toward the two men. They did not hear him coming.

He hit one at the base of the skull with what Chaz thought was the catalyst rock—until he realized that his fist had been empty. Even without the rock it was a crushing blow with a sudden, almost berserk, fury in Chaz powering it. The man he had hit went to his knees and fell over sideways. The other man began to turn with an astonished look on his face; and Chaz leaped on him, knocking him to the floor, beating away at him with fists and knees as he fell, in a silent frenzy of attack.

It was a few seconds before Chaz realized that the second man was not moving either, before he could make himself stop. When he did stop and scrambled to his feet his fury ebbed, leaving him feeling sick and helpless. His stomach heaved, but there was nothing in it to come up. He clung gratefully to the side of the isolation chamber to keep from falling, as his trembling legs threatened to give way.

The nausea and the trembling passed. The two on the floor still had not stirred. He could not bring himself to look at either man's face. Luckily, the first one he had attacked lay face down. Without turning him over, Chaz managed to strip off the other's clothes, including the white coat, and put them on his own naked body. He turned to the curtain, pulled it aside and located the door of the hospital room.

Opening the door a crack, he peered out.

What he saw was an ordinary, circular, hospital ward with two nurses inside the round desk-area that occupied the ward's center point. Both of them had their heads bent over some paperwork at the moment. Holding his breath, Chaz opened the door a little further, stepped through, closed it behind him and walked casually toward the entrance to the ward, a quarter of the way around the circle of rooms.

Neither of the two nurses looked up. A second later he was in a wide corridor, busy with hospital personnel and visitors alike. Three minutes later he was alone in a four-seater PRT car leaving the basement of the hospital for the Central Terminal, courtesy of the credit card in a pocket of the man whose clothes he had taken.

As the car hurtled through the tunnelways, Chaz glanced over the stations listed on the car's directory and saw that he was in the Chicago area.

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evidently up around Evanston. Chicago had been too big to seal as a single sterile unit; and to this day it was a number of connected domes and underground areas. It was this ramshackle character of the big city that had given him hope that he could manage to evade capture in it long enough to see Waka again and pass the test for work on the Pritcher Mass. Now, with someone else's credit card, his chances were even better.

Of course, the man from whom he had taken the clothes and the card might report the card stolen—although, if he was really a member of the Citadel, he might not want to tell the police how he had lost it. But even if the card was reported lost, Chicago was so large that by the time the Central Computer got police sent to the last place he had used it, he could be miles away. In twenty-four hours, of course, all automated units of the Chicago area could be programmed to refuse that particular card when it was submitted to a computer outlet for credit or purchase. But in twenty-four hours he ought to be able to see Waka, pass the test, and get officially accepted for work on the Mass. Once he was accepted, all Earth's police could do would be to keep him under room arrest until time for him to ship out to the Mass.

Things were looking up. Chaz relaxed and even grinned a little to himself, remembering the astonished look on the face of the first man he had jumped, back in the hospital room. Plainly, the last thing they had expected was that their sensorially-deprived patient would have as much energy left in him as Chaz had shown.

But then he sobered. He might be free now, but in addition to the police, the Citadel would be after him—and why should they have been interested in him in the first place? He had never had anything to do with the criminal element of the sterile world. He did not even know much, if anything, about it beyond what he, like everyone else, heard on the news or read in the magfax.

He tried to marshal what meager knowledge he had, so that he could get some idea of what he might be up against. But there was little even in the attic section of his mind to go on. In a cashless society, of course, the criminal element operated by markedly different tactics than they had in the bad old days when credit was expressed in pieces of paper you carried about and traded with other people. Now, credit was hardly more than a convenience. What really paid off was power. Power to control the credit ratings and the class of the cards that were computer-issued to you or your associates. Power to compel people to provide goods or services that could not ordinarily be bought, or which were out-and-out illegal. Power to tap the wide, unsterile areas for things that might not be available within the limited space of the sterile ones.

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Of course, it was that last reported power of the Citadel that led the strong belief that it, unlike any other element of society, had contacts outside the sterile areas. Though who these contacts could be with, since anyone who stayed outside could hardly last more than a month or two before dying of Job's-berry rot, was a question. What could you offer a dying person to buy his or her services? Comforts? Drugs? Luxuries?

Not being a Neopuritan, Chaz paid no attention to the legend that there were rare people outside who had survived the rot. That was nonsense. The rot was not a chemical or viral thing that sickened the body. Its effect was purely mechanical. The spores in the air sooner or later found their way into the lungs of anyone unshielded. There they sprouted and grew, until eventually the lungs were too choked to function. Immunity did not enter into the situation; any more than the Neopuritanic belief that the rot, and its parent the Job's-berry, were a judgment upon Man for his sins in polluting and despoiling the world.

No, there was no need to get scriptural about it. Planetwide pollution had led to plant mutations; and plant mutations had led to the Job's-berry. The Job's-berry would lead to the end of the human race. There was nothing the remnant of humanity existing in the shielded, sterile areas could do now to exterminate the plant and clean the world's air. All they could hope for was to fight a losing battle; long enough for the Pritcher Mass workers to find another habitable world, to which a select handful of the race could emigrate, so that the race itself could survive and make a fresh start.

Chaz reined in his thoughts with a jerk. The little PRT car was almost to the Central Terminal destination he had punched at random when he got into the vehicle. He consulted the directory again and repunched for the location of Waka's office. The directory clicked, and showed the change in its destination window.

He sat back, his mind now off on another topic. What had happened to Eileen? She had seemed perfectly sure of herself up to the point where she had tried to use her witchcraft to discipline the Gray Man; and the Gray Man had laughed at her. What happened to a witch who lost her abilities? Chaz ransacked his mental attic without turning up any information on that point. For the first time he considered the possibility that she might be in the hands of the Citadel, just as he had been; and a cold hand seemed to take a firm grip on his stomach.

Of course, she had been helping him; and since it was this that had got her into trouble, if she was in trouble, it was not surprising to find himself concerned about her. But aside from that, it was still surprising that, with the little time they had been together, she should have got-

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ten so firmly caught in the gears of his emotions. He had always thought of himself as a loner with a cynical view of his fellow men and women; the last man in the world likely to find himself feeling undue affection for anyone on short notice. Unless . . . they had somehow gotten to know each other unusually well that night of the condominium party. He wished he could remember more clearly what had gone on. In fact, once he had a moment, he should sit down and dig those memories out. Nothing in the mental attic could hide from him if he went after it determinedly enough.

The PRT car slid on through tunnels and docked finally in the basement of the building in which Waka had his office, and possibly his living quarters as well. Chaz got out, more awkwardly and creakily than he had expected. His sudden explosion of activity after lying in that coffin-like isolation chamber for an unguessable number of hours had apparently strained muscles. He felt as stiff as a football player the day after a game.

He walked up and down, swinging his arms in the privacy of the momentarily empty PRT dock. The exercise loosened him up and got his blood flowing again. He turned toward the elevator tubes; and then remembered that he was still wearing the white hospital jacket. He took it off and stuffed it into a recycle-tube slot at one end of the dock. This left him dressed in slacks and a short-sleeved white shirt. Not exactly a jumpsuit—but not odd enough to attract undue attention either.

He took the tube up to Waka's office; but found the door to it locked. He walked down the corridor of the floor he was on until he came to a rank of phones. Sticking his credit card into the slot of the first one he came to, he punched for Central Locating, and asked it to see if Mr. Alexander Waka could be found and communicated with.

There was a small wait, while CL worked. Then a chime sounded from the phone grille and the screen lit up with a miniature image of Waka's head and bare shoulders.

"I'm at home," said Waka. "Is this an emergency? Oh—so it's you, Mr. Sant."

"It's an emergency," Chaz said. "I need to be tested immediately."

"Immediately?" Waka looked doubtful. "I don't think I can do that."

"Isn't it your duty to take any Pritcher Mass candidate at any hour?" Chaz said. "Sorry, Mr. Waka. But it *is* an emergency. Emergency enough so that I'm ready to complain to the authorities, if I have to, to get a test right away. A complaint like that could cost an examiner his license."

The examiner smiled. A small, hard smile.

"You might be interested to know, Mr. Sant," he said, "I've had a call

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from Police Central about you. Are you sure you're ready to contact the authorities yourself, just to complain about me?"

Chaz looked back at him for a second.

"So much for that commitment to the Pritcher Mass you were telling me about last time I saw you," he said.

Waka stayed where he was, frowning.

"All right," he answered, abruptly. "Apartment 4646B, the same tower you're in. Come on up."

He cut contact and the screen went blank.

Chaz punched off the phone at his end. For a second he leaned against the phone stand in relief. It was all over but the test now; and the test should be no problem. It was true he no longer had the catalyst; but in the isolation chamber imagining that he held it worked just as well.

Still leaning against the phone, he half-closed his eyes and made an effort to feel the rock once more in his hand. It was about the size of an orange. A little roughness on it fitted almost comfortably between his first two fingers . . .

He stood there, making the effort to imagine it. Evidently, however, conceiving something like this was much easier inside an isolation chamber than outside one. Slowly it grew on him that now, just standing here, as he was, he did not seem to be able to convince himself that the catalyst was really with him.

VI

He stayed where he was by the phones for a good ten minutes, working with his imagination in an attempt to visualize the catalyst in the real sense in which he had visualized it while he had been in the isolation chamber. But he could not convince himself that he was succeeding—and, worse, he could not feel the confidence he had felt in the isolation chamber, or earlier at the train wreck, when the catalyst had been physically in his hand.

Still, he kept trying. He only gave up after he had been stared at several times by people going and coming from offices along the corridor; and he began to fear that he was becoming conspicuous.

Waka would not wait forever. Chaz headed toward the elevator tubes, still working to make his imagination build the feel of a rock in his hand, the confidence of a catalyst in his mind.

Chaz was on the twelfth level of the building he was in. It was normal for offices to be on the lower levels, apartments on the upper. Anything over thirty stories was somewhat unusual, but Chicago went back to the days of tall buildings. He stepped aboard an up-floating disc and let it carry him skyward.

At the forty-sixth level he got off and went down a much narrower hallway than the one he had left below, until he came to a doorway of imitation walnut, with the figures

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4646B glowing on it. He knocked, and the door opened immediately—as if Waka had been standing waiting behind it.

The examiner grunted, seeing Chaz; and then, sticking his head out into the corridor, looked up and down swiftly. Dressed now in a blue sleeping robe, he was not the Waka whom Chaz was used to seeing during office hours. This man was harder of manner, and at the same time furtive. He pulled his head back in, beckoned Chaz curtly inside the apartment and closed the door.

Inside, the apartment was more luxurious than any Chaz had seen since his childhood. There was a kitchenette at one end of the room he entered and, at the room's other end, was an open door which gave a glimpse of an unusual extra chamber, apparently furnished for nothing but sleeping.

"What took you so long?" Waka demanded. His phone chimed. "Wait here."

He turned and went into the sleeping room, closing the door behind him. Chaz could hear him answering the phone from in there. The murmur of his voice was audible, but it was not possible to make out the words.

Chaz was left standing in the midst of the main room of the luxury apartment. It was the sort of place that would have made a fine large home for a couple with a pre-school child or two. For some reason, Eileen returned to his thoughts with a poignancy he could hardly bear. She had deserved better than what he had brought her. Somewhere, there could be no doubt about it, she was in trouble—whether in the hands of the Citadel or the police.

The worst part was there was nothing he could do to help her. At least—nothing he could do unless he could pass the Pritcher Mass test now and end his own need to keep running. It all depended on his passing that test. Once more he made the effort to imagine the feel of the catalyst in his fist.

It would not come. Anger twisted itself up, like a tight, hard knot within him. There was no good reason he should not be able to evoke the catalyst. For that matter, he ought to be able to pass the test even without it. Either he had the talent to pass, or not; and he knew he had it. Letting anything get in the way was as ridiculous as Eileen letting some childish superstition get in the way of her talents when she had tried to control the Gray Man. What was it the Gray Man had accused her of having—a psychological block? That was nothing more than his own trouble with the catalyst in different form. The catalyst was a psychological prop—an emotional prop, for that matter—in his case.

The thought of the catalyst as nothing more than a prop brought a sense of relief to him. It was as if, somewhere inside him, a barrier had gone down. But before he had time

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to examine the feeling of relief, Waka came back.

"That was Communications Central, running what they said was a routine spot check," Waka said. "When you called here, were you using somebody else's credit card?"

"That's right," said Chaz.

"Get rid of it then, before they catch you with it on you. Will you?" Waka was not obviously sweating, but he passed a hand across his forehead as if to wipe away perspiration. "Do you realize records will show that particular card made a call to my number? If they connect the card with you, it'll be known you called me."

"What difference would that make?" Chaz asked, looking at the examiner closely. "It's natural I'd make one last try to get accepted for the Mass. And, once accepted, the authorities can't do anything about it to me—or you."

"You don't understand," said Waka, shortly. He turned away to sit down at a small table—a real table, not one extruded from floor or wall. He opened a drawer and took out a pair of achromatic goggles and a tube of mixed colors. "Sit down. Just get rid of it, I tell you."

Chaz seated himself.

"Who are you worried about, except the authorities?" he asked. He looked thoughtfully at Waka. "You don't happen to have anything to do with the Citadel, yourself?"

"Put on the glasses," said Waka, shoving them across the tabletop. "What color do you want to try to separate from the rest?"

"Wait a minute." Chaz let the glasses lie. "The only people you could be worried about would have to be from the Citadel. But if you belong to them, why are you giving me this test? From what I've seen so far, for some reason the last place the Citadel wants me is on the Mass. How is it you're giving me a chance to go there?"

"Because I'm a goddam fool!" burst out Waka. "Stop asking questions! Put on the glasses."

Chaz picked them up, but he did not immediately put them on.

"Tell me something else first," he said, "just one more thing; and then I'll put them on and we can get into the test. Did you ever know anybody you thought ought to qualify for work on the Mass, but who didn't seem to be able to pass the test because of some psychological block?"

"Yes, yes—of course! I told you they were always self-convinced if they did it! Now, if you don't start taking this test right away, I'm not going to give it to you. Choose a color."

"Right," said Chaz.

He spoke absentmindedly. A strange thing was happening inside him. It was as if his inner world of personal knowledge was being turned upside down so that what had been west was now east and north had become south. If Waka was telling the truth, and his own inner feel-

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ings were correct, then a catalyst had never been necessary to anyone. How had the idea of such a thing gotten started, then? And yet, though it did not jar him to give up the idea of the catalyst, his conviction about the figure of the crystal growing in the nutrient solution was stronger than ever.

Suddenly, he felt perfectly sure and certain inside about his ability to pass the test, with or without a catalyst. He put the glasses on; and everything in the room around him went gray.

"Choose," said Waka.

Chaz looked and saw the rice grains spread out on the tabletop before him.

"Red," he answered.

He stared at the grains. They were all one identical color; but when he looked for those that might be colored red they appeared to stand out to his eye as if they had been individually equipped with flags. Something shouted "red" at him although his eye refused to see any color difference whatsoever.

This time he did not bother to take the grains one at a time and line them up so that later he would be able to tell where he had gone wrong. There was simply no way he could go wrong. He merely brushed away all grains of the wrong color and corralled those he was after in a small pile.

Then he took off the glasses. He had not failed. The red-colored grains were all together in the pile he had made.

Waka sat back in his chair with a heavy sigh. All at once the tension he had shown earlier was drained out of him.

"Well, that's it, then," Waka said. "It's done now."

He reached over and pressed the buttons on his phone. There was a second's hesitation, then a single musical note sounded briefly from the speaker.

"Pritcher Mass Central," said a voice. "Recording your report, Examiner Alexander Waka."

"I've just examined and found qualified a volunteer for work on the Mass," Waka said. "His name is Charles Roumi Sant, Citizen Number--" he looked at Chaz, raising his eyebrows.

"418657991B," Chaz supplied.

"418657991B," Waka repeated to the phone. "He'll want to leave for the Mass as soon as possible. Meanwhile, he may need immunity from Earth's legal procedure."

The phone said nothing for a moment. Then the voice at the other end spoke again.

"We check the name Charles Roumi Sant with the records earlier supplied us by you, on a volunteer tested five times previously without success. We have already signalled Police Central that this man is signed for work on the Mass and no interference with his departure for the Mass must be permitted. Charles Roumi Sant may place himself directly under Mass protection at our

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Central Headquarters Chicago office, or he may have free time for nine hours until 2000 hours this evening; at which time he will report to the office, ready for departure to the Mass."

"He'll come immediately—"

"No I won't!" Chaz interrupted the examiner. He leaned over to the phone. "This is Charles Sant. I'll be there at 2000 hours."

"Bring no possessions," said the phone. "Nothing from Earth, even from the sterile areas, is allowed on the Mass."

The connection was broken from the other end. The phone speaker hummed on an open line.

"You're taking a chance," said Waka, punching the phone off.

"I need those nine hours," said Chaz, "to find someone."

"You won't," said Waka.

"I won't?" Chaz leaned forward above the table. "What do you know about it?"

Waka's face twisted unhappily.

"Enough," he said. "Too much. Don't you know once you've gone to the Mass, you can never come back here? You'd have to forget her anyway. Forget her now and make it easier on both of you."

Chaz reached across the table and took hold of the front of his sleeping robe.

"What do you know about Eileen? What do you know about all of this?"

Waka did not move.

"You're an amateur," he said almost contemptuously to Chaz. "Do you think you can scare me? I've been scared by professionals."

Chaz let go of the robe.

"All right," he said grimly. "I think I can put most of it together. You're tied up with the Citadel, too. So you know about what happened to Eileen and me. You know where she is now."

"Not now. I swear I don't," said Waka.

"You're tied up with the Citadel. But the Citadel doesn't want me to go to the Mass; and, you've just passed me so that I can go. If you're willing to go against the wishes of the Citadel to pass me, why won't you help me find Eileen?"

Waka slumped in his chair.

"I told you I was a fool," he said heavily. "But there's a limit to how much a fool any man can be. Now, get out of here."

"No," said Chaz, thoughtfully. "No. Maybe I'll stay here the whole nine hours."

"Get out!" Waka shot to his feet. "*Now!*"

"All right," Chaz said, without moving. "If you answer a few questions for me, I'll go. Otherwise, not."

"It'll mean the end for you, as well as me, if you're found here by the wrong people," said Waka, a little hoarsely. "Doesn't that matter to you?"

"I'll risk it," said Chaz. "Want to talk?"

Waka sat down again, heavily.

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"Oh, damn it, damn it, damn it!" he said helplessly. "What am I going to do?"

"Talk," said Chaz.

"All right." Waka stared at him. "I work for the Citadel as well as the Mass. I passed your name on to the Citadel when you first came to be tested. They did some computer and other checking and came up with the opinion that you on the Mass would be bad medicine for them—don't ask me why, or how. And that's all I know."

"Not quite. What about Eileen?"

"They said they were going to put someone on you," Waka answered sullenly. "It was her, evidently."

"Put someone on me? What does that mean?"

"Someone . . ." Waka made a helpless gesture with his hand. "Someone to find out all about you, to find a weak spot in you, something that would make it easy for them to keep you off the Mass." He looked at Chaz still sullenly. "She's not witch-born for nothing. She must have taken you apart one night and found out what made you tick; so she could report back to the Citadel on it."

"Eileen?" The happenings the night of the party began to glimmer up vaguely into Chaz' consciousness, like the shape of sunken objects dimly seen in deep water. "But she said she didn't have to do anything she didn't want to—and she helped me escape from them. Why help me escape, if she was working on me for the Citadel in the first place?"

"You don't know?" Waka almost sneered. "She's a woman as well as a witch. She fell in love with you—don't ask me why. A witch ought to know better."

"What do you know about witches?"

Waka glared at him for a second, then slumped again.

"I'm one," he said, miserably. "What did you think?"

"You?"

A wild suspicion roared like a tornado suddenly into Chaz' mind. He took two steps to where Waka sat, reached down and ripped open the blue sleeping robe. Underneath was a padded or inflated device, which fitted around the man's waist to make him look thirty pounds heavier than the rest of his body now showed him to be.

"You're the Gray Man!" Chaz exploded. "Answer me! You *are* the Gray Man, aren't you?"

Waka drew the robe back around himself with a hiding motion, as if he would try to escape inside it.

"Leave me alone," he said in a husky whisper. "Get out of here, and just leave me alone!"

"Oh, no," said Chaz, grimly. "If you're the Gray Man, you really do know where Eileen is—"

Waka began to laugh bitterly.

"Know? Me?" he said. "Do you think I'm that important to the Citadel? You saw how that witch of yours was ready to push me around

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and bully me. I'm a go-between, that's all. I tell the coven what the Citadel wants from them; and the witches in the coven tell me how much they'll do. I'm—do you know what I am?"

Tears brimmed unexpectedly in Waka's eyes and slid down his cheeks.

"I'm a slave!" he said, hoarsely. "I've got paranormal talents just like you; but not the kind that makes me able to stand up to anybody. The Citadel owns me—*owns* me!"

He caught himself, shook his head abruptly, swallowed and sat up. When he spoke again, his voice was stronger.

"No," he said. "Cancel that. Not quite. They don't quite own me. Part of me belongs to the Pritcher Mass—and that part's free of them. Someday the Mass is going to find a new, clean world for people; and when it does, it's the ordinary people who'll be left behind and the talented ones who'll escape. Someday there'll be no Citadel to make a slave out of anyone like me!"

He got to his feet. Curiously, he seemed to have refound some of the stature and dignity Chaz had seen in him on the day in his office when he had told Chaz of his commitment to the Mass.

"Now," he said, calmly, "if you've got any sense at all, you'll clear out of here. The Citadel will be sending someone around to check up on me; as soon as they get the record of your call to me, with that credit card you're carrying. By this time they know that card's being used and it means you're using it. So, if you use your head, you'll go right to the Pritcher Mass Chicago office. But in any case, stay clear of me. Because when they come I'll have to tell them you're looking for Eileen Mortvain; and then they'll know where to look for you."

"You're sure you don't know where she is?" Chaz demanded.

Waka shook his head.

"I wouldn't tell you if I did," he said. "But I really don't. They took her right after they took you. I've no idea where."

Chaz turned and went out the door. As it closed behind him, he heard Waka's phone chime with another call.

On the odd chance that that call was from someone involved with the Citadel, he wasted no time. Half an hour later saw him once more on a train from Chicago to the Wisconsin Dells, the passage paid for by the credit card from the hospital attendant, which he still carried.

He arrived at the Dells with seven and a half hours left of his available time before reporting to the Mass Chicago office. He took a PRT car to his own condominium. Happily, the dock in the condominium basement was empty of travelers, any one of which might have been a resident who could recognize him. He took the elevator tube.

His attic memory had preserved the number of Eileen's apartment,

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following that one visit he had made with her to pick up the wolverine. But when he came to the doorway he remembered, the door itself was standing wide open in locked position as was customary with tenantless apartments; and all the furniture had been retracted into the floor or the walls, so that the automated hall-cleaning equipment could do maintenance here until a new tenant took over.

He stared into the empty apartment for a moment. Then he left it and went down the hall to the phone stand and called the building directory.

"Do you have a forwarding address for Ms. Eileen Mortvain, apartment 1433?" he asked.

"I'm sorry," the computerized voice of the directory fluted from the speaker. "No Eileen Mortvain has been listed among the tenants in this building during the past year."

"Check for error, please," said Chaz. "I happen to know she was occupying apartment 1433 just a day or two ago, at most."

There was a very slight pause.

"Checked for error. None, sir. No Eileen Mortvain listed in this building during the past year. Previous occupant of 1433 was male and departed apartment eighteen days ago."

There was no point in arguing with a machine.

"Thanks," said Chaz, automatically, and closed off the phone connection.

He stood thinking for a moment. Then he reached for the phone again and punched the call number of another apartment in the building whose occupant he knew.

"Mrs. Doxiels?" he said, when a female voice answered. "This is Chaz Sant."

"Why, yes Chaz." There was a slight pause before Mrs. Doxiels went on. "We were just wondering if you'd been hurt more than you thought in that train wreck. No one's seen you since—"

"No, I'm fine," he interrupted. "I've just been unusually busy. I wanted to ask you something, though. You know Eileen Mortvain?"

"Eileen Mortvain?"

"1433," Chaz said, harshly. "She came to at least one of your condominium parties in the amusement rooms. You must know her. Well, she's moved, it seems; and I was wondering if you knew where, or when she left?"

There was a peculiar pause for a second at the far end; then Mrs. Doxiel's voice answered on an entirely different note.

"Oh yes, dear!" she said. "I'm so sorry; but Eileen didn't want anyone to know she was here. We've been taking care of her in our little place. She's here now, and when she heard me say your name she started waving at me. You're to come right away."

Chaz sighed with relief.

"I'll be right down," he said.

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"We'll be waiting—but, Chaz dear!" cried Mrs. Doxiel's voice over the phone, "if you run into anyone, don't say where you're going!"

"I won't," he said, and broke the connection.

He was turning from the phone rank when a strange noise sounded before him. It was like a low-pitched animal whine, half-chewed into words. He heard it clearly, but it was a second before it translated in his head into understandable speech.

"Lie," it said. *"Lie. Not go."*

He turned. What he saw, crouched next to the wall into such a small shape that he had to look twice to be sure it was actually there in the soft lighting of the hallway, was a wolverine.

"Tillicum?" he said, hardly able to believe that it was Eileen's pet or familiar he was seeing.

"Don't go," the wolverine's whining was twisted into a mewing sort of speech. *"Eileen not there. Woman lies."*

"Where then? Where is Eileen?" Chaz lowered his own voice to a whisper just in time, as a door farther down the hall opened and a man came out. However, the man turned away from them, going off toward the elevator tubes.

"Other place. Sent me—watch for Chaz. Chaz mustn't try find. Must go Mass. Message—go Mass, Chaz."

Chaz felt his eyes start to burn as he stared down at the strangely hard-to-see animal.

"Why should I believe you?" he muttered. "I can't trust anyone else."

"Save Eileen," mewed the wolverine. *"Save Eileen by going Mass. No other way. Go now. Or all die—Eileen, Chaz, Tillicum, all."*

"No," said Chaz, softly but fiercely. "No, I don't think I will. Show me where she is and I'll go."

"Can't show." Tillicum seemed to shrink even smaller. *"Out of talk now. Last message. Remember spell—think Eileen name but once you are there. On Mass, think Eileen name. Now . . . gone . . ."*

And, unbelievably, Tillicum was in fact gone. Chaz blinked at the spot by the wall where the wolverine had been. For just a moment his sight had blurred; and when it

The Analytical Laboratory/May 1972

PLACE	TITLE	AUTHOR	POINTS
1.	Mirror Image	Isaac Asimov	2.39
2.	A Transatlantic Tunnel, Hurrah!	Harry Harrison	2.55
3.	Solo Kill	S. Kye Boult	2.61
4.	Lunchbox	Howard Waldrop	3.40
5.	The Observer	Clifford D. Simak	3.81

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cleared again, the spot was empty.

In his head, out of his attic memory, Eileen's voice sang again, as he had heard it in his apartment.

"Gaest thou down tae Chicago, sae fair.
Harp at ye, carp at ye, water and wine.
. . . Think'st thou my name but once thou art there,
So shalt thou be a true love o' mine . . ."

He had indeed thought her name in Chicago, after he had escaped from the hospital; and now—he faced it finally—he was a true love of hers. Or perhaps he had been in love with her even before that, following that unclear evening in the party rooms. At any rate he cared for her now, as he had never cared for anyone else, and if he had to believe anyone, he would choose to believe her wolverine and its message.

He turned and left the condominium; and returned safely to Chicago, to the Pritcher Mass office there. Ten and a half hours later, he was being lifted into orbit by a ramjet, to rendezvous with an interplanetary ship bound for the Mass with supplies. He was spaceborn after that for twenty days of one-gravity thrust and retro-thrust. At the end of that time and four billion miles from Earth, he was delivered, naked as a newborn babe and still damp from the decontamination shower he had been through, into a passage tunnel leading from the ship to the entrance of the massive metal platform beyond Pluto on which the Pritcher Mass was being built. A tall, slim, dark man in blue coveralls met him and led him to the heavy airlock doors of the entrance itself, now open on the interior darkness of the Mass platform. He was about to proceed into that darkness, when the tall man checked him with a hand on his arm.

"Your last chance," the tall man said. "Stop and think. You can still turn around now, get back on the ship and ride home to Earth."

Chaz looked at him.

"I wouldn't turn back now, even if I wanted to," he answered.

The tall man smiled.

"They all say something like that," he said. "Take notice of the warning, then. You know the line from Dante's *Inferno*, that was supposed to be written over the entrance to Hell?

"'. . . *Ye who enter here.*' Canto the Third, isn't it?" said Chaz, delving into the attic to find the line. "Yes, I know it. Why?"

"We've paraphrased it for our own use," said the tall man. "A very important warning for newcomers. Look."

He pointed over the airlock entrance; and Chaz now noticed that there were letters incised in the metal above it. He moved closer until he could read them.

"ALL EARTH ABANDON, YOU WHO JOIN US HERE."

TO BE CONTINUED

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the computer was a fish

Computers are no better at playing chess than the people who program them. But they learn fast, and they never forget. There are no computer chess programs capable of beating a top-flight human player—yet!

GEORGE R. R. MARTIN

Once upon a time there was a fish.

A most unusual fish, worth several million dollars. It lived in a one-story building with a grass-covered roof on the campus of Northwestern University. It had transistors instead of scales, tape reels instead of fins, and an electronic memory instead of gills. It preferred eating punch cards to eating fish food.

Most people would have called the fish a computer. To be precise, they would have called it a Control Data Corporation (CDC) 6400.

It was a CDC 6400, of course. But it was also a fish.

A fish, you see, is a chess player. A bad chess player. The title is awarded by other players when one of their peers exhibits a singular skill in losing chess games. Popular synonyms are "patzer" and "meatcake."

And Northwestern's CDC 6400 was a chess player. A bad one. A fish. During years of tournament play, the machine earned the title not once, but several times. A whole legion of human opponents regularly blasted the machine off the board.

Then, one day during the summer of 1970, the fish became a champion.

It happened in New York City, during the twenty-fifth annual convention of the Association for Computing Machinery (ACM). Meeting at the New York Hilton Hotel, the ACM decided to enliven its proceedings with the world's first all-computer chess tournament.

Six competitors swam to the surface for the three-round event, including programs from sites as distant as Texas and Alberta, Canada. Among the six was Chess 3.0—Northwestern's electronic fish.

The machine, of course, could not leave Northwestern's Evanston, Illinois campus. It played by teletype.

In the tournament room in New

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York, programmer Keith Gorlen, then twenty-one, manned the teletype, typing in each of the opponent's moves. From there, the moves were carried over the telephone wires long distance to Evanston, where Gorlen's crony David Slate, twenty-five, was tending the computer.

The CDC 6400 would type each move neatly on its feedout sheet, and the position on the large display board would change. Invariably, the image of the piece to be moved would wink three times, vanish, reappear on its new square, and wink thrice again. Then the machine would think.

Sometimes the reply would be made in seconds. In more complex positions it would take minutes. But sooner or later another piece would wink on and off, and the machine would make its reply on the big board at Northwestern's Vogelback Computing Center.

Back in New York, the teletype in front of Gorlen would suddenly begin to chatter angrily. From a thousand miles away, Chess 3.0 would make its reply, and Gorlen would get up and move the appropriate piece on the official tournament board.

The tournament, as the first of its kind, drew large crowds of spectators to the Hilton. Most were ACM delegates, but a sizable contingent of chess players also turned out to see what the machines could do.

Chess 3.0 defeated a program from Bell Telephone Laboratories in New Jersey handily in the first round, but the attention of the spectators and the press was elsewhere. In the limelight was a seven-million-dollar IBM 360/91 from Columbia University, programmed by world postal chess champion Hans Berliner.

The Berliner program was the tourney favorite. It lived up to its advance notice in round one, taking only nine moves to destroy an entry written at the University of Alberta. But in round two, it met Chess 3.0.

The match (see game one) began with an opening variation straight from the chess books and developed into a fairly even game. Slowly, however, the Northwestern machine began to gain an edge, taking advantage of several imprecise moves by the Berliner program. On move forty-seven, Chess 3.0 sacrificed an exchange, giving up a rook for a less valuable bishop. The audience at the Hilton, more than four hundred strong, burst into applause. Three moves after the sack, it was checkmate. The Northwestern machine was all alone at 2-0.

The rest was anticlimax. In the final round, Chess 3.0, leading the field by a full point, polished off a program from Texas A&M to finish with a perfect 3-0 score and become the world's first computer chess champion.

Larry Atkin (left) and David Slate at work on the Chess 3.5 program.

(Greg Suski photo)

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Last summer the ACM held its annual convention in Chicago, and the Northwestern machine was again on hand to prove that its title was no fluke. This time it faced seven electronic challengers, including the first overseas contestant, a program written in Austria by Gerhard Wolf of the University of Graz.

The Northwestern machine, playing in a new, slightly improved incarnation as Chess 3.5, had little trouble with the larger field. Berliner had temporarily retired his program for a rewrite, so the chief threat to the champion's title came from a newcomer, a program called "Tech" written by James J. Gillogly of Carnegie-Mellon University.

Once again the two contenders met in round two, after each had won its first-round game. Tech played the opening well (see game two), but Chess 3.5 complicated the middle game, and when things finally settled down, the Northwestern machine was up a bishop with a strong attack. The rest was a matter of technique.

The final hurdle in the champion's path to a second title was a program written by a Marine captain, operating out of a Navy computer in San Diego. It too was 2-0 going into the last round. But its victories had not left the spectators impressed. In the second round, the program from Bell Telephone Labs had utterly crushed the West Coast entry in the early going, only to lose after it missed checkmate not once, but several times. Perhaps the fact that the New Jersey computer was temporarily kayoed by a lightning bolt midway through the game had something to do with its erratic play.

No such flukes marred the final round. After only a few moves it was clear that the contest was a total mismatch, as Chess 3.5 ripped apart the opposition in fine style. It took the electronic fish only thirty moves to torpedo the Navy. Some three hundred spectators were on hand to applaud when the Northwestern machine delivered mate.

It was a good winner. "Thank you for an enjoyable game," it typed out to the loser when the action was over.

Chess 3.5 says, "Thank you for an enjoyable game" only when it wins. When it loses, it sulks and says merely, "Game is over."

In between its two championships, the machine entered another tournament—against humans. The leaders of the Northwestern University Chess Club, impressed by its showing in the first all-computer event, recruited the electronic monster to play on one of Northwestern's six teams in the North American Intercollegiate, held in Evanston in late December, 1970.

This time the machine said mostly, "Game is over." It finished 2-6 and dragged down its entire team. Titles or no, it was still a fish.

Chess 3.5 was the fifth chess-playing program written at Northwestern. Easily the best of that series,

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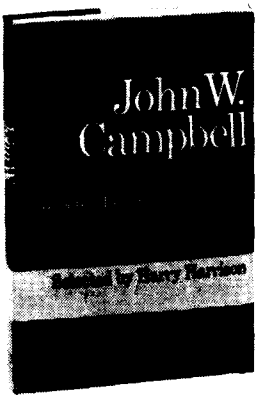

it is probably the best chess program written to date. But in human terms, it remains a fish.

On the rating scale of the United States Chess Federation, the Northwestern computer is at best a high "Class C" player. That makes it slightly worse than the majority of America's tournament chess players.

Many people assume that computers should be invincible chess players. A computer can calculate with superhuman speed. A computer does not make mistakes. A computer cannot overlook a move, or miss a threat.

Ergo, the myth runs, a computer can outthink any human. A computer will never lose.

Unfortunately, it's not that simple. Those computers that do play chess do lose. Often. And badly. The legend of the invincible chess computer both overestimates the capabilities of computers, and underestimates the complexities of chess.

"The problems of programming a computer to play chess are rather imposing," Berliner wrote recently in *Chess Life & Review*. "Clearly the computer cannot look at all possible game continuations up to checkmate (or a draw) as there are 10^{120} possible games from the initial position. If every atom in the universe was a computer and each had been calculating chess variations at the rate of one per second for fourteen billion years (since the beginning of the universe), they would have completed

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only a small fraction of the total number of variations to be calculated."

Computers can play invincible tic-tac-toe. But any human who bothers to learn the method can do the same. All the computers do is apply the technique the programmer has taught them.

But no one has yet devised a perfect winning strategy in chess. There is no infallible method to feed into the machine. Chess-playing computers, therefore, must operate much like chess-playing humans. They must try to think ahead several moves, and anticipate the various plans the opponent may select. And, when they have calculated all the alternatives, they must decide which is most favorable.

In computers, these two steps are referred to as the "look-ahead tree" and the "evaluating function," respectively. Humans would call them calculation and judgment.

The human versions generally work better, as the long series of trials that led to Chess 3.5 indicates. The program that won the computer championships was the product of years of work by three Northwestern students: David Slate, Keith Gorlen, and Larry Atkin.

The fish first began its evolution in the spring of 1968, when the acquisition of a CDC 6400 to replace an older CDC 3400 tripled Vogelback's computing capacity. Engineering junior Atkin and sophomore Gorlen, both computer buffs, thought the new machine should play chess. They began work on a program in their spare time.

The first version was completed by early summer. "It was a completely terrible program," Slate, the third member of the trio, says now. "It barely made legal moves." Even that was a minor triumph. The last-place finisher in the 1971 computer tourney had not yet progressed even that far. It lost all three of its games because it persisted in trying to cheat.

Slate, then a graduate student in physics, got into the swim when he chanced across a copy of Atkin's crude program during a visit to Vogelback. The discovery sparked his interest. He traced down the author to exchange ideas, and decided to write his own program.

Starting work immediately, he pieced together a very rough, primitive program by midsummer. He got some computer time and set out to test it.

Slate took the white pieces and opened pawn to king four. The computer studied the situation, decided it had no legal move, and declared the game a stalemate.

Setback number one.

Slate went back to the tape decks, and discovered that the machine was looking at the wrong place in its memory. Instead of moving rooks and knights and pawns, it was trying to move log tables and statistics and demographic trends. And having no luck—since Slate had not pro-

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grammed it on how a logarithm moves.

Slate corrected that. The second test went much better. The machine played badly, but legally. Until, halfway through the game, it made use of a special rule to capture a pawn *en passant*.

Immediately it began to make illegal moves. It had confused the special subroutines on capturing *en passant* and queening a pawn, and was under the impression that its pawn was now a queen.

Slate fixed that flaw, too. But there were others. It took all summer before the computer was able to play a legal game of chess.

In the end, however, Slate had himself a program. Meanwhile, Atkin had continued to work on his program, and it too was ready for unveiling.

Atkin's work, done at Vogelback, had aroused the interest of Professor Benjamin Mittman, the director of the computing center. Mittman set up a special "Chess Night" exhibition for late September, 1968, featuring a game between himself and the Atkin program on a large display board. He was somewhat surprised when Slate, not yet connected with Vogelback, popped up with a second program. But arrangements were quickly made to include it in "Chess Night."

Each of the programs had its own strengths—and weaknesses. But neither was very good.

Atkin's version was a far more complete program. It had both a look-ahead tree and an evaluating function, and could take variable amounts of time on each move according to the complexity of the position. But, because Atkin himself was a very weak player, the evaluating function was a bad one.

Slate was a much stronger player; rated an Expert by the U.S. Chess Federation. His evaluating function was vastly superior to Atkin's. But his program had no look-ahead. It replied instantaneously, and saw only a half-move deep.

Mittman defeated the Atkin program after a long struggle. Slate's program, playing much faster, was burned down in thirteen moves after it allowed its opponent to fork its king and queen.

Since the other game was still going, Slate asked for volunteers to play his program. The first volunteer was so flustered by the idea of playing a machine that he dropped material quickly, and resigned. The rest of the volunteers all beat the computer. But that lone victory—the only one for either program that night—stood out.

"The program didn't look so bad, even though it was terrible," Slate says. He is positive that his program would have gone on to lose the game if its opponent had not resigned.

After "Chess Night," Slate's program was shelved while he worked on other things. Atkin, however, entered his version in the annual

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Northwestern University Championship sponsored by the campus chess club.

The entry brewed up a storm of protest. Several human competitors flatly refused to play the computer, and a petition was circulated to bar it from the tournament. The shrieks became even louder when the program won its first-round game. Paired against a decidedly inept freshman who had never played in a tournament before, the machine gave the game away several times, only to have it handed right back.

The protests died when the computer reverted to form and lost its next four games, often in spectacular style. By the end of the tournament, players were begging to be paired against the machine.

Atkin, slightly abashed at his program's miserable showing, turned to Slate in the aftermath of defeat. "Look, Slate," he said, "why fight each other? Let's join forces."

The idea fired Slate's enthusiasm. He took charge of the project and set to work combining the strong points of both programs. The new program was ready by October, 1969, after a summer of work. Modeled on the basic structure of the Atkin program, it included Slate's evaluating function plus other improvements. Slate dubbed it Chess 2.0, and said it was "obviously an order of magnitude better than the previous programs."

When the program was completed, Slate and Atkin set out to publicize it. As a joke, they drew up a mock issue of the *Software Availability Bulletin,* the CDC publication that promotes the company's "software" or standardized programs. Copies of the fake bulletin, heralding Chess 2.0, were mailed all over the world.

And suddenly, to everyone's surprise, orders began to come in.

Slate and Atkin were slightly stunned, but delighted. They converted Vogelback into an underground software factory, and sent out copies of the program to more than twenty CDC computers.

Each of those, in turn, made their own copies and passed it on still further. Chess 2.0 spread tentacles all over the world.

Its rapid dissemination was dramatically illustrated in the spring of 1970, when Slate received a letter from David Levy, an International Master from Scotland. Levy reported playing the program at the University of London, and made some suggestions for improving it.

Shocked at the program's travels, Slate investigated. He discovered that England was the fourth link in a long chain of universities that had passed on Chess 2.0.

Later that summer, Levy played the program on television for a BBC special on computers. He won handily. Down in Australia, meanwhile, Chess 2.0 was used as the focus of a special exhibition to raise funds to send an Australian team to the chess olympics. The computer did not make the team it helped to finance.

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And back at Northwestern, Slate and Atkin entered their now world-famous program in the 1970 University Championship, to avenge the humiliation of the previous year.

The computer finished 2-3. It played respectable chess this time. But it still lost. It was still a fish.

And that was not good enough. Slate continued to tinker with the program, and received added incentive when the all-computer championship was announced.

Chess 3.0 was finished just before the tournament. It was sixty-five percent faster than Chess 2.0, featuring minor improvements in the look-ahead tree and evaluating function and a few new features. The electronic fish had come of age.

The future of chess-playing computers appears to be a bright one. With the ACM computer tournament now an annual event, interest in chess programs is at an all-time high, and rising.

Slate, now a staff member at Vogelback, and Atkin, now a graduate student, both remain at Northwestern, where they are currently sweating over Chess 4.0, a complete rewrite that they hope will eclipse all earlier programs. At one time they hoped to have it ready for the 1971 computer championship, but other work threw snarls into those plans, and Chess 3.5—a souped-up Chess 3.0—proved a capable substitute. Now the target date for the completion of Chess 4.0 is August, 1972, when the ACM meets in Boston for the third computer championship.

The Northwestern programmers should face a rough fight in their quest for a third straight crown. The possible return of Berliner, who has been at work on a rewrite ever since his favored program was upset in 1970, poses one very real threat. As the world postal chess champion, Berliner is personally a much stronger player than any of his American rivals. If he can instill only a small portion of his playing skills into one of the big computers at Carnegie-Mellon University, where he is now working, then the Northwestern team will face a formidable opponent.

Another possible title contender is MacHack, the chess program written by Richard Greenblatt at the Massachusetts Institute of Technology. MacHack VI was the first chess program in the U.S. to play respectable chess, and achieved a Class C rating as early as 1968. Slate says MacHack VI was "king of the hill" from 1966-68, but that several current programs could defeat it.

Greenblatt, however, retired MacHack VI in 1968, and is said to be working on MacHack VII, a new version of Class A strength. How close MacHack VII is to perfection remains a closely guarded secret. Greenblatt had draped his programming efforts with a cloak of mystery, ignoring letters, phone calls, and telegrams from Slate and other would-be rivals.

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The Northwestern programmers, who have several times challenged MacHack to meet Chess 3.5, fear that Greenblatt may be planning a dramatic comeback in some future tournament. And they admit that the thought worries them.

They also worry about the Russians.

In February of 1970, Slate received a letter from Russia's Mikhail Botvinnik. Botvinnik is a computer expert. He is also an International Grandmaster and three-time chess champion of the world. He has predicted in the past that a computer will someday be world champion.

Botvinnik wrote that he had retired from active competition to head a Soviet programming effort aimed at producing a chess-playing computer of master or even grandmaster strength. It will be a while before any program gets that good. But Botvinnik, in his letter, said that he expected to have a program of some sort ready to enter in the 1972 ACM tournament.

Today, the invincible chess-playing computer is a myth. But Botvinnik and Slate and Berliner and others are convinced that it will not be a myth forever.

Once upon a time there was a fish. A small, harmless fish. A minnow.

But the fish grew. It's still a fish. But not the fish of old. A shark, perhaps.

And tomorrow, it may not be a fish at all. ■

BIOGRAPHY

George R. R. Martin is a recent graduate of Northwestern University, where he received a B.S. and M.S. in journalism. He served four terms as president of the campus chess club, and has watched the Northwestern computer chess program develop from its infancy. At present, he's a VISTA Volunteer assigned to the Cook County Legal Assistance Foundation.

First Annual Computer Chess Championship
New York, 1970

rank	*program, authors*	*computer, location*	*results round 1*	*round 2*	*round 3*	*final score*
1.	CHESS 3.0 David Slate, Larry Atkin, Keith Gorlen	CDC 6400 Northwestern U., Evanston, Ill.	W-3	W-4	W-5	3-0
2.	KING-DALY Kenneth L. King, Chris Daly	Varian 620/I, on site	W-5	L-3	W-6	2-1

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3.	COKO I Dennis Cooper	IBM 360/65 Bell Telephone Labs, Whippany, N.J.	L-1	W-2	D-4	1½-1½
4.	BERLINER Hans Berliner	IBM 360/91 Columbia U., New York	W-6	L-1	D-3	1½-1½
5.	SCHACH Dan Drew, Rolf Smith, Franklin Ceruti	IBM 360/65 Texas A&M U., College Station, Texas	L-2	W-6	L-1	1-2
6.	MARSLAND Tony Marsland	Burroughs 5500 Burroughs, Inc. New York	L-4	L-5	L-2	0-3

GAME NUMBER ONE

First Annual Computer Chess Championship, 1970

White–BERLINER (IBM 360/91, programmed by Hans Berliner)
Black–CHESS 3.0 (CDC 6400,
programmed by David Slate, Larry Atkin, and Keith Gorlen)

	WHITE	BLACK		WHITE	BLACK
1	P-Q4	N-KB3	13	R-N5	QxP
2	P-QB4	P-K3	14	Q-N3	QxQ
3	N-QB3	B-N5	15	PxQ	NxN (d)
4	P-K3	BxNch (a)	16	KPxN	O-O
5	PxB	N-B3	17	O-O	P-QR3
6	P-Q5	N-K2	18	R-B5 (e)	P-Q3
7	PxP	BPxP	19	BxB	PxR
8	R-N1	N-B3	20	B-K6ch	K-R1
9	B-Q3	Q-K2	21	PxP	QR-K1
10	N-B3	P-K4 (b)	22	B-QB4	N-N5
11	B-B5	P-K5	23	B-K2	N-K4
12	N-Q4	Q-B4 (c)	24	B-K3	P-KN3

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25	R-Q1	R-B2	38	P-KN4	P-KN4
26	R-Q4	N-B3	39	PxPch	KxP
27	R-Q2	K-N2	40	K-R3	N-B5ch
28	B-QB4	R(2)-B1	41	BxN	KxB
29	R-Q7ch	R-K2	42	B-K2	R-Q7
30	RxRch (f)	NxR	43	B-B1	RxP
31	B-Q4ch	K-R3	44	B-B4	R-B6ch
32	B-K5	R-B1	45	K-R4	RxP
33	P-R4	P-B3	46	B-N8	P-K6
34	B-K6	R-K1	47	B-B4	RxB (g)
35	B-KB7	R-Q1	48	PxR	P-K7
36	B-QB4	R-Q8ch	49	P-N5	P-K8=Qch
37	K-R2	N-Q4	50	K-R5	Q-R8 mate

Comments

(a) So far, both machines have been playing a popular "book" opening called the Nimzo-Indian Defense. But now the Northwestern program steers the game into less- analyzed lines.
(b) Threatening P-K5, with a pawn fork that wins a piece.
(c) And now the Northwestern program wins at least a pawn.
(d) Since it now has an edge, Chess 3.0 is eager to trade. Small advantages become larger when there is less material on the board.
(e) A blunder. The rook had to retreat. The Northwestern computer wins an exchange with its reply.
(f) Bad. Trades help Chess 3.0. Better was B-Q4ch, keeping the game more complicated.
(g) Chess 3.0 gives back the exchange, knowing that the advanced pawn cannot be stopped from queening. It's all over.

Second Annual Computer Chess Championship
Chicago, 1971

rank	*program, authors*	*computer, location*	*results round 1*	*round 2*	*round 3*	*final score*
1.	CHESS 3.5 David Slate, Larry Atkin, Keith Gorlen	CDC 6400 Northwestern U., Evanston, Ill.	W-8	W-2	W-3	3-0
2.	TECH James Gillogly	PDP-10 Carnegie-Mellon U., Pittsburgh, Pa.	W-4	L-1	W-6	2-1

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3.	RAYMOND Herbert D. Raymond III, Capt., USMC	XDS-940 Fleet Computer Programming Center Pacific, San Diego, Calif.	W-7	W-6	L-1	2-1
4.	DAVID Gerhard Wolf	UNIVAC 494 St. Paul, Minn.	L-2	W-7	D-5	1½-1½
5.	CCCP Steven Bellovin, Aron Eisenpress, Andrew Koenig, Benjamin Yalow	IBM 360/91 Columbia U., New York	L-6	W-8	D-4	1½-1½
6.	COKO III Dennis Cooper, Ed Kozdrowicki	UNIVAC 1108 Bell Telephone Labs, Piscataway, N.J.	W-5	L-3	L-2	1-2
7.	SCHACH Rolf Smith, Franklin Ceruti	UNIVAC 418-III Tinker AFB, Okla.	L-3	L-4	W-8	1-2
8.	MR. TURK Gary J. Boos, James Mundstock	CDC 6600 Univ. of Minnesota Minneapolis, Minn.	L-1	L-5	L-7	0-3

GAME NUMBER TWO

Second Annual Computer Chess Championship, 1971

White—TECH (PDP-10 programmed by James J. Gillogly)
Black—CHESS 3.5 (CDC 6400, programmed by David Slate, Larry Atkin, and Keith Gorlen)

WHITE	BLACK	WHITE	BLACK
1 P-K4	P-QB4	4 NxP	N-B3
2 N-KB3	N-QB3	5 N-QB3	P-Q3
3 P-Q4	PxP	6 B-QB4	P-K3

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7	O-O	P-QR3	30	Q-QB7	BxRch
8	B-K3	N-K4	31	RxB	R-QB1
9	Q-K2	Q-B2	32	Q-K7	Q-Q8ch
10	B-Q3	N(K4)-N5	33	K-B2	R-B7ch
11	P-KB4	P-K4	34	R-K2	Q-Q5ch (g)
12	N-B5	B-K3	35	K-B3	R-B6ch
13	N-Q5 (a)	NxN	36	R-K3	Q-Q8ch
14	PxN	BxN	37	K-B2	Q-Q7ch
15	BxB	N-R3	38	R-K2	QxPch
16	Q-Q3 (b)	P-KN3	39	K-N1	R-B8ch
17	B-K4 (c)	P-B4	40	R-K1	RxRch
18	B-B3	P-K5	41	QxR	Q-K5
19	Q-Q4	B-N2	42	QxQ (h)	PxQ
20	Q-N4	PxB	43	K-B2	K-B2
21	RxP	QxP (d)	44	K-K3	P-Q4
22	QxNP (e)	O-O	45	K-B4	K-K3
23	R-B2	Q-Q6	46	P-QN4	R-QB1
24	R-K1	N-N5	47	P-KR3	R-B7
25	R-Q2	Q-K5	48	P-QR4	RxP
26	R(Q2)-K2	KR-N1	49	P-N5	PxP
27	Q-Q7	QxQP	50	PxP	P-N4ch
28	P-QN3	NxB	51	K-K3	K-K4
29	RxN	B-Q5 (f)	52	P-N6	P-Q5 mate

Comments

(a) Aggressive and complicated. Up to now, Tech has played sharply and enjoys an edge.

(b) Here the challenger starts to go wrong amid the complications. Simply retreating the bishop would have left Tech with the superior game.

(c) A serious mistake, losing a piece. The bishop had to go back to R3. On this square, it can be forced to move into a pawn fork—and that's just what happens.

(d) Chess 3.5, now far ahead, makes a dangerous oversight with this move. If Tech now takes the hanging queen's pawn, it will get a vicious attack on the champion's king.

(e) But no. Tech goofs too, and grabs the worthless knight's pawn.

(f) A pin that wins the exchange.

(g) Chess 3.5 should now trade off, going into an easily-won endgame a rook up. Instead it wastes time with useless checks.

(h) Suicide. Tech's last, faint chance was to keep its queen on the board and try to draw.

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JACK WODHAMS

budnip

There's nothing like a loose nut to screw up a sound design!

Leo Summers

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He was a model young officer, keen, dedicated, but withal conscious of his youth and flatteringly deferential in his attentiveness to his seniors. He knew what he was doing. Trustworthy, loyal, practical, sensible young man, but not lacking initiative, and ever ready to crisply and efficiently carry out the directives of his elders. And he satisfied by relieving his superiors of many of the more tedious chores that can at times so irritate the higher leadership.

He had many admirable qualities, had young Captain Strustle; he knew his place, was always most civil, and he displayed a most gratifying respect for authority. Well-bred young fellow, unfailingly courteous, with a rare understanding, why, one might almost describe him as a gentleman of the old school. Nothing, it would seem, was too much trouble for him, and he was a most thoughtful and conscientious young officer.

A young man of Strustle's type and caliber did indeed give cause to hope that the next generation would not be completely lost. An exemplary young man. A most reliable and deserving young man. He would go far. Oh yes, he would go very far indeed. Strustle knew what he was about all right.

Strustle was the most engaging, scrupulous, the most natural choice. And so they chose him.

"I beg your pardon, sir? Did you say 'No,' again, sir?"

"That is what I said, Punter, exactly and precisely—no."

"But, sir! It's well overdue, it's . . . Why, sir?"

Strustle coolly studied the techman. "Because I say so, Punter."

Punter was bewildered, at a loss. "But there's no reason for any more delay, sir, all tests have fallen within approved affirmative margins. There's nothing to suggest we delay any longer, is there, sir?"

"Punter," and Strustle sounded patient, "I am the appointed activation officer, is that not so? The evaluation of this situation has been entrusted to me, not to you, and the decision rests upon my judgment of the suitability of the moment."

Punter was uneasy. "Mr. Kable, the Colonel and the Committee might not like it very much, sir, do you think? Already it seems we have been dilatory, and we could easily . . ."

Strustle's voice was sharp in cutting him off, "Mr. Punter, I would ask you who is in charge here, the vested authority, hm-m-m? I do not take my position lightly, believe me. You will proceed with reactivation when I instruct you to, Mr. Punter, and not before—do I make myself clear?"

"But I don't understand, sir," Punter persisted, "we need the hands if we're to go ahead, and Colonel Wynse said that we . . ."

"Will you cease, Mr. Punter!" Strustle barked now, aggravation getting the better of him. "I will not have you questioning me, sir, and

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just you remember who is in command here." He smiled then, astutely. "There is no hurry, Mr. Punter, is there? We have all the time in this world . . ."

"I don't know what his game is," Punter confided to his assistant, Beverley, "but I don't like it, not one little bit."

"It's not for you to worry, Mr. Punter, is it?" she said. "If he's at fault, he'll have to explain it to them as soon as they get out."

"Oh yes," Punter nodded, "as soon as they get out—but *what if he doesn't intend to bring them out?*"

"Now surely he can't be thinking to keep them in there indefinitely," she clucked. "Don't you think you might be putting too much emphasis on this? He's just being super-thorough, perhaps, that's all. When we do bring them out, he wants everything to be two hundred percent."

Punter was not so sanguine. "We were to work together, be brought together at the earliest possible time. Captain Strustle and the rest of our team were only to be watchdogs to the automatics, that's all, you know that. Instead he's switched over to manual hold, and there's no need for it, none whatsoever."

"It's a big responsibility," she suggested, "couldn't that have something to do with it? There's nearly a thousand people, Mr. Punter, and he wouldn't want to make a mistake, would he?"

"Bev, my dear, we've had survey and assessment, analysis and selection, comprehensive and satisfactory, otherwise we would never have touched down. Since then our team has largely confirmed the data. There's absolutely no reason remaining for holding back any longer."

"Maybe he knows something you don't know," she said, "maybe he has secret orders, or something. He could have a perfectly legitimate reason."

"Yes?" Punter was not persuaded. "Then I would like to know what it is. We've been down over a month now, and all we're doing is horsing about. Dammit, there's no likelihood that we'll go back home again, is there?"

Captain Strustle gauged his man. "Well, Glober, can you do it?"

Glober hedged. "Mr. Punter is head of the section, sir, would he be in agreement with your proposal?"

"Mr. Punter is head by virtue of his untested and purely theoretical competence. As commanding officer, I can, if I see fit, replace him with someone who I think will serve to be of greater benefit in establishing this, our beachhead. Do you follow me?"

"I . . . think so, sir. You would demote and . . . replace Mr. Punter, if you thought this to be in the best interests of our small community."

Strustle became amiably disposed towards this useful expert. "That is so, Glober, you show an excellent grasp. Punter, I feel, is actually ill-

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suited to this task, the man lacks imagination, flexibility, foresight." Strustle gave Glober the shrewd eye. "To my way of thinking, a younger person of such as your intellect might have more flair and a readiness to adapt to what is, after all, an embryo circumstance."

"I see." The tip of Glober's tongue peeped as he saw.

"Glober, we are in a unique position, you and I. At our backs we have a vast store of technology. We are a seed landed here, and the land is good, and it needs but a touch for this seed to burst forth and grow. The touch has to be right, Glober. Here, at this point in time, the quality of this seed is in our hands, the mastery of this seed within our control. Is my meaning clear?"

"I think I begin to see what you're driving at, sir."

"Good. I need a man of firm character and resolve, a man I can trust." Strustle paused. "I want a man who will not become corrupted by the power that comes to those who form the very top leadership."

"You are thinking perhaps that the programmed government might be modified, sir?"

"I do indeed, Glober. Younger blood, fresh ideas. I think, quite frankly, that it would be sheer folly to resuscitate the rather staid members of the Committee, to let them resume their rather prosaic and uninspired mandate over us. We need vigor and enterprise, Glober, and I think for a while that we can well do without citizen Kable and his ilk, eh?"

"It would seem to hold interesting possibilities, sir. Could you give me more detail of quite what you have in mind?" Glober asked. "This would leave me in no doubt, Captain, as to the wisest course to pursue for the common good."

"I admire your perceptiveness, your freely open mind, and willingness to consider alternatives that might break us from a deadly mold at this so vital point, the very beginning. It is so essential that this start should be as propitious as we can make it, isn't that so?"

"We should do our best, sir," Glober agreed.

"Of course. Now I have Bahmedin and Elmot in charge of the armory. With myself and you, this makes four out of our team of twenty-five." Strustle smiled. "We would seem to be outnumbered, but the only real opposition we might meet could come from Punter—and I don't think any objection he might raise will be insurmountable. If necessary he can be compulsorily retired."

"And me, sir?"

"We want to build surely and well, Glober. Your job will be to break out and revivify those persons we initially consider to be the most desirable, one at a time. This way they can become acclimatized conveniently to the slightly changed state of affairs."

"Selecting, yes." Glober pondered. "Plucked out to be treated individ-

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ually. Yes, it could be done, I think."

"You'll be given complete authority. You can be Minister for Manpower in the new cabinet I shall create." Strustle archly winked. "And Minister for Womenpower too, eh . . .?"

"It's monstrous," Punter declared, "absolutely outrageous. You've gone mad, sir,. No, it cannot be countenanced, it's totally against the prescribed program. It's impossible. And it's intolerable. You simply cannot quite casually disrupt the entire procedure just to advance some personal adjustments of your own. It's unthinkable!"

"I am in command," Strustle reminded him calmly.

"Your command is a temporary one, sir, and is limited to the performance of certain duty, of carrying out a specific duty entrusted to you. You have command of an operation, *not* of the entire project." Punter's indignation waxed hot. "And if you fail to perform this duty, deliberately, then you become guilty of extreme negligence and you will, sir, leave yourself open to the severest reprimand."

"My command," Strustle was imperturbable, "empowers me to adopt the course that I consider most desirable and in accord with our welfare. This I am earnestly seeking to do."

"You procrastinate, sir." Punter was flushed. "I advise you most strongly to put away this foolishness that you harbor. It will do you no good, and indeed will serve you ill the longer you neglect to implement the revival of proper delegated persons."

"Mr. Punter, I do not think I require your advice. The truth is, Mr. Punter," and Strustle was markedly cool and assured, "that I begin to see you as an obstructionist, a man devoid of vision. You patently are at odds with the majority, and your attitude, I am sad to say, may oblige us, with great reluctance, to declare your redundancy."

"Huh? Redundancy? What are you talking about?" The implication colored Punter a deeper hue. "The majority? us few? You have no power to make me redundant, sir, and don't you think it. I don't know what fanciful notions you may be cherishing, but you had better forget them, and quickly. I can obey you within the limits of your predetermined authority, but I cannot condone or support this ever more clearly inexcusable delay in bringing forth our compatriots."

"Punter," and now Strustle's voice had a biting edge, "in the absence of a recognized superior, the decision-making function becomes indisputably mine. What *I* deem best is the ruling we must abide by. And if you do not cooperate, Mr. Punter, **if you persist in willfully hindering the rightful modifications that I see** fit to introduce, then you will leave us no recourse but to relieve you of your tenure."

Punter was staggered by the ap-

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parent effrontery. "What? You have no right. It's not . . . it's . . . this is absolutely beyond your jurisdiction."

"I am standing you down as of now, Mr. Punter," Strustle stated flatly. "You are suffering from stress, I feel, and some mental aberration. You should take a rest."

"What? Now look here, Captain . . ."

But Strustle overrode him. "A well-earned rest, Mr. Punter, and it will in no way reflect upon your abilities. Mr. Glober will take over while you recuperate, so you can be assured that everything will be in good hands."

"Oh yes?" Punter sputtered, "Oh yes? Mr. Glober is my junior, under my authority, and *he* will take his orders from *me*, sir. He is not qualified to act upon his own, and you have no right to place such a burden upon him."

"I act as I think the circumstances dictate to be most advantageous to our survival, Punter. It is not for you to question the significance of my directions. As commander, I am informed of matters that you know nothing about. The commander must be obeyed, Punter—anything else is insubordination."

"But there are a thousand people in storage out there!" Punter cried. "You cannot deny their restoration indefinitely."

"They have kept for so long, Mr. Punter," Strustle bent, "and they can keep for a little while longer."

"But," flustered, Punter strove to pungent argument, "but it's . . . it's like murder, a form of living death, to unnecessarily prolong their boxing."

"I disagree." Strustle's smile was thin. "You can hardly describe the continuing preservation of life as murder, now can you? You see how your values have become muddled?"

Punter was at a loss for words. "You . . . I have never . . ."

"You have a tendency to panic, Punter, to inordinate and careless haste. They will all be recovered . . . in good time . . . at a manageable pace."

"You won't get away with this," Punter choked. "There'll be the devil to pay later, mark my words. As for Glober," he swore, "I shall positively forbid him to acknowledge any instructions he may receive from you . . ."

But to Punter's dismay and frustration he met mutiny in Glober, quiet and apologetic but mutiny nonetheless. And Punter encountered physical restraint from the large sergeant named Bahmedin when he would have attempted to institute the block revivification sequence cycles on his own initiative.

"This is insane, criminally insane," Punter told Beverley. "He is off his head entirely."

"What can we do about it?" she asked. "We have no arms, have we, and with that bodyguard of his . . ."

Punter wriggled in vexation. "What could we do with arms if we

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had them? Such things are not our business, and are a supply solely to provide defense in the face of hostility."

"Isn't *he* hostile?"

Punter was exasperated. "It was hardly considered likely that we would have an internecine war on our hands almost as soon as we arrived. Our numbers are such, and our assumed interdependence so vital, that the question never arose. This is . . ." Punter shook his head. "I still find it most difficult to comprehend."

"If this place had not been so ideally accommodating . . ."

"Extraordinarily corroborative," Punter was still able to enthuse, "not a hitch. We should be praising the Lord and thanking our luck that everything has gone so fantastically well. Instead, this junior buffoon has to develop a case for personal aggrandizement, to change our whole enterprise into one seemingly to serve his own narrow purposes."

Beverley brooded. "The people will have to be released sometime, he can't keep them in suspension forever as some kind of ornament."

Punter paced. "I don't mind telling you he has me very worried. Bev. This is a project we undertook all together, shared all together. We each and every one of us had our jobs to do, our planned roles. Great heavens, this is a colony base we're to establish, not a game. We need every man, we . . . we should be sinking down roots now, not toying with piecemeal proposals to embark upon some wildly novel conception dreamed up by an overgrown schoolboy."

"He seemed such a nice fellow before," Beverley said. "I wonder what caused him to change so suddenly?"

"I begin to strongly suspect his former image." Punter wagged a finger, "It wouldn't surprise me to learn now that he purposely duped us, that it was his intention all along to seize this opportunity for abuse."

"Surely there's something we can do, Mr. Punter?"

Punter held his head. "There must be, but I'm damned if I know just what. Everything is so unreal, and this does not help at all. Home is so far away. I keep thinking of people to call, bodies that might have a policing influence, but of course there's . . . we can't reach them. It . . . seems only yesterday."

"Oh, Mr. Punter, we *must* make him see reason somehow—we *need* all the others."

"One here, one there," Punter despaired, "if he stretches it out he could create endless confusion, disordering the aging patterns, upsetting the timing relationship between one and another. It's not fair. Already there is discrepancy between our aging and knowledge and experience, and that of all those being held. The longer we wait, the bigger the gap, the harder it is to fill in."

"And the less time we have together."

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"Beverley, I . . ." he threw up his hands, "I'm damned if I know. It makes no sense, is pointless. It throws everything out of kilter. I find it hard to think straight."

"There must be something," she said, not very helpfully. "All those people, our friends—there *must* be something we can do . . ."

"You want *Mrs.* Aymelite, but not *Mr.* Aymelite, is that correct, sir?" Glober inquired, completing checking his short list.

"That is so, and," Strustle added meaningly, "I want her brought to my quarters as soon as possible. Glober, I . . . expect you to employ some discretion, hm-m-m? Do you read me?"

"Of course, sir."

"Good." Strustle winked. "I think we are going to get along, you and I. Now I want you to take Sergeants Bahmedin and Elmot and, ah, to make their choice of a couple of females they might like to rescue. Also Ball and Feltman. The rewards go to those who deserve them, eh? Oh, and you, of course, can also select what you might fancy."

"Thank you, sir."

"We'll have no nonsense, Glober. We have control, and we shall not lose it. Women have their place where they rightfully belong, and in our society they shall willingly serve those who are the masters, right?"

"The thought is not without attraction, sir."

"The prizes go to the strong, Glober. I realized long ago, before we came, that out here it would not be the weak stomachs who would survive. Out here, the man with the strongest will wins—and the man with the strongest will is me, make no mistake about that. And if you aid my will, Glober, it will not be to your regret, that I can promise you."

"I believe you, sir. Your ideas do indeed have a basic inescapable soundness."

"Do you think so? I'm glad to hear you agree. We're going to go a long way, you and I; Glober, you have the right approach and appreciation of the possibilities."

"I'd like to think so, sir."

"You have. Fathers of a world, Glober, human genesis. It's a responsibility not to be taken lightly, is something that persons with a high consciousness of destiny cannot fail to influence. Do you read me?"

"I feel fortunate and privileged to be given this opportunity, sir. It looks to be much more interesting and satisfying than anything I had anticipated."

"You can rely on it, Glober. Now," Strustle pointed, "do you think you can prize these workers out separately O.K.? Without busting any communal circuits? We don't want any accidental tragedies, do we, unless it should involve a committee member."

"Oh, it can be done, sir, with care and the furnishing of substitute supplementary linkages."

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"Great. Get to it, then, Glober, and let's make the start to populating our empire . . ."

"It was nice of him to allow you to visit me," Punter fretted. "A fine thing, I must say. I'm virtually a prisoner now in my own cabin. What's going on out there? Is Glober seriously undertaking to comply with that young upstart's wishes?"

"I'm afraid so, Mr. Punter." Beverley averted her eyes. "He seems to be quite taken up with the captain's ideas, and he's doing everything he's asked."

"And you, you're helping him, too?"

"Mr. Punter, I can't do anything else, can I?" she appealed. "They're so determined, and there are so many lives at stake, I daren't do anything to be in error."

"Of course not, of course not," he mollified quickly, "you're not to blame, not in any way. And the last thing you can afford is to take risks that might jeopardize the lives of all those who remain. No," Punter declared, "you are entirely innocent in this, it's none of your wish or doing whatsoever, I know that. But," he gazed into space, "I can't believe that it is really happening, that it should all result in this way. It makes me feel so infuriatingly impotent."

"Perhaps later, as we break more and more of the people out of storage," she ventured, "we shall be able to rally some . . . support . . . ?"

He relented his disparagement at her hopeful fading. "My dear," he took her hand, "I have been a fool, and terribly slow in grasping this fellow's intentions. It was simply incredible that anyone would want to do such a thing, and even now, at this time, I can still find it hard to believe."

Punter seemed to notice then that he was holding her hand, for a moment was nonplussed what to do about it, somewhat self-consciously carefully let go. She was sorry. "C'hm. I have been giving the matter some thought, Beverley, as you can well imagine, and I begin to perceive what might be at the heart of his scheme. We know from our own traumatic first two or three weeks how strange and disoriented we felt, and how weird and subduing it is to admit how many years have passed since we left home, and how very uncompromisingly distant home has become. The logic is irrefutable and accepted, and yet the mind remains for a long time unconvinced that the links have been irreparably broken.

"He has the upper hand, Bev," Punter soberly mused. "His plan has quite primitive cunning to aid its success. The trickle he permits can, in their bewilderment, be brought quickly to assent to his dominion. Giving high marginal priority to militiamen and potential henchmen, he can cull essential technocrats gradually and singularly and provide them small recourse but to acknowledge his regime."

"It will grow on us."

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"That, my dear, is succinctly put," Punter admired.

"He can supply glib justifications, to be sure, specious excuses, and for the history books this will suffice; for the entrenched are always valid. Yes," he nodded, "entrenchment is what he seeks, surely, and by the time he deigns to permit our proper and designated leaders to draw breath again we shall all be a good deal older, I fancy. Possibly even enough to make some committee members his juniors."

"Particularly Mr. Kable and Colonel Wynse," Beverley guessed.

"Particularly. By the time he's prepared to awaken them, they'll still be sprightly youngsters compared to the rest of us."

"But they will still be obsolete. The whole committee will very shortly be obsolete, won't it?" she said, "left behind, out of touch."

Almost involuntarily he took her hand again. "Beverley, your quick intelligence gratifies me. Indeed, I wonder if you might not have a clearer conception of this contretemps than I have."

"No, Mr. Punter, really," she claimed modestly, "it's you, somehow, who seems to crystallize the essence of a problem . . ."

"Your problem is that you've got a brain of solid crystal, marble between the ears it's called, otherwise known as blockheadedness." Mrs. Stephanie Aymelite was scathing. "I told you last week, a couple weeks ago, hell, whenever it was, that you didn't have a turkey's chance come July. What's the matter with you, living under water?"

Strustle's smile was lopsided. "Things have changed a little, Stevie. Wheels don't turn around here unless I give the magic word."

"Is that right?" She scanned her surroundings. "Well, from the look of the place your wheels could be rusted solid. This is what we've landed ourselves, is it?"

"Uhuh, sweetest spot on this whole world." Strustle relished his fortune. "A five-hundred by five-hundred island, isolated enough to have its own virtually enclosed ecology, equator temperate to subtropical all year, lagging Earth by a couple million years or so."

"Nothing dangerous, huh? No," she answered her own question, "otherwise you'd be in an armored bug-suit." She gazed about again. "Where is everybody? I didn't think I'd be one of the first out."

Strustle kept his equanimity. "I arranged to have you brought out ahead especially, Stevie, with one or two others. As a favor."

Her voice held chill sufficient to cause a brass monkey anxiety. "I would thank you, Captain Strustle, to curb your unwanted familiarity. I am Mrs. Aymelite to you, please, and further, I neither ask nor recognize any so-called 'favors' you may do me. You can twiddle your string from now to footrot, but from me you'll get not even a used tea bag."

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Strustle made effort to remain pleasant, but his thumb hard-rubbed his fingertips, betraying. "You think not? Stevie—Stephanie, I don't think you fully realize what the situation is here. *I* am in command, Stephanie. I'm the boss here, and what I say goes."

She was not impressed. "Bursting your breeches in a little moment of glory, eh? What are you hoping for, a break between scenes? Forget it, Captain. My husband can eat you alive."

Strustle barely managed mastery of his temper. "At the moment your husband is in no position to eat anything, not even a marshmallow, *Mrs.* Aymelite." He leaned towards her, glitter of suppressed anger in his eye. "He is still blissfully asleep, Mrs. Aymelite. And he will stay that way just so long as I choose that he should do so, do you read me?"

She squinted at him. "What are you getting at?" She raised palms. "We're here, we're getting started, aren't we? You can't keep him under, can you." She laughed. "Captain, you've got an inflated sense of your own importance suddenly? Do you think they might let you keep a few of us tucked away for your own convenience?" She was amused.

"You think it funny, do you?" His face was taut. "Well, get this into your head, Stevie—*they* are not in charge here, *I* am. And I will keep in storage who I want, as many as I want, for as long as I want—do you understand that? Nobody—nobody at all!—is brought out unless *I* say so, unless *I* order, unless *I* permit it—nobody!"

Strustle straightened, his chin lifting. "I am in command, full command, unquestioned command, and I am going to stay in command. You understand *that,* and you understand it good, *Stevie."*

She was unbelieving. "What? Oh now, come on, a joke's a joke, but . . ." His face stopped her, and at last disquiet twitched her as she realized that he was indeed most deadly serious. "But you can't mean it, you can't possibly, you can't . . . can't keep people blindly shut away, not now we're here, we've arrived, that everything is all right."

He squared his shoulders and stood as tall as he could, and was pleased to wear a tight savage smile of triumph. "I can do what I damn-well like. The control is mine." He looked her over with proprietary insolence. "I give preference to those who find favor in my eyes."

Her color mounted. Then her teeth clicked and, "Captain, I don't know how many balls you think you have in the air, but you split no banana with me. Now you'll just get Babe out to join me, hear? And our friends and the rest, like they should be, and stop this talk like you think you've got to be King Kong."

He tried, but he could not prevent his fuse from burning to ignite powder. "You high-and-mighty stuck-up bitch! Too good for me, are you? Well, we'll see about that, do you

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hear? You'll come to me, you'll crawl to me! I'll make you to be grateful if I so much as spit in your direction!"

"You clack-shackled grubber," she flared icily, "you haven't got what it takes to even enter the preliminaries. You'll make progress all right—over my dead body!"

Strustle glowered, trembling a little, his fists clenching and unclenching. "Maybe," he hissed, "maybe over your husband's dead body, huh? . . ."

"Beverley, I've been thinking," tribulations bring people together, and now Punter held both her hands, "his tactic is fundamentally one of ransom. Bargaining on our sensibilities, he holds the bulk of us still as hostage."

"Those he has brought out have been spineless," she complained. "He seems to know just which ones will most easily succumb."

"A man does his best to appraise a brand-new condition," Punter pardoned, "and he generally takes the path that buys him most time."

But Beverley was not to be diverted from disapproval. "He's treating the female complement like slaves. He seems to think he can dispense women like birthday presents. It's most degrading."

"I agree. It's a most barbaric reversion."

"Most of the men don't seem to think so. He's getting quite a clique about him." She sounded aggrieved. "Harvey, the way he's going, he's going to build a strong gang. And I . . . I can't see how we'll be able to beat him."

Punter patted her knuckles in traditional comfort. "Where force may be so meager as to be unavailing, then here must there be the employment of guile."

"Yes, but what, Harvey?" she chafed. "His power is growing, and it won't diminish with the passage of time. We can see the way things are going."

Punter concurred, "Yes. But there are lives at stake, and surely many more lives than any man would wish to have on his conscience. He is risking those lives, however fractionally."

"Glober is solidly committed now. Harvey, they can keep some under suspension and threat until they themselves die. They're ugly. And the pressure he's putting on Mrs. Aymelite, he's hinted that there could be a malfunction in the compartment that holds Babe Aymelite. It's . . ." She shivered.

"I know. We must try and put a stop to it." He squeezed her fingers. "Now a while ago you said something, quite casually, but it recurred to me, and I became rather struck by its relevance. You said something like, 'Perhaps he is delaying to make no mistake, to be absolutely two hundred percent certain that everything is all right.' Do you remember?"

"No."

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"Never mind. He's been so thoughtlessly lucky. It's really quite obvious . . ."

"You ought to know, shouldn't you?" Strustle demanded crossly. "You're the doctor, you must have some idea of what she's got."

"I'm sorry," the doctor said stiffly, "but I have never encountered such a case before. I can only treat her for fever, that is all."

"But," Strustle flapped irritably, "you must recognize the symptoms, a similarity, be able to make some comparable diagnosis."

"She is a very sick young woman," the doctor snapped, "and I cannot treat her with *anything*, do you understand? Her reaction could be fatal."

"She might die anyway, mightn't she?" Strustle gasped. "God, you must be able to do something."

"If you hadn't so drastically slowed down the proper resuscitation of the intended whole and viable community, we would have a capably staffed laboratory to speedily run tests, and we would have a far greater variety of resources tapped to provide much wider range of choice for possible answers."

"You want some labtechs? I'll have them out by this afternoon," Strustle promised.

The doctor was tart. "You fool, don't you listen? Haven't I just spoken of resources? Where does a lab get its supplies? Who might they not need to call upon for specialized advice? Which body to perhaps have the blood-immunity to provide sera for us all?" He snorted. "It's no good pulling one doctor out of the hat, and expecting him to perform miracles. I need help." And he stabbed out an intimidatingly grim finger, "And you need help, and fast!"

"Me?" Strustle paled a shade. "Why?"

"Because whatever it is Mrs. Aymelite has, it is my strongest suspicion that it is infectious. I doubt very much that her isolation may be either in time or anyway effective."

"What?" Strustle knuckled a palm, given food for thought, a contingency spectre risen from limbo, a most grave and bothersome factor to create indecision. "Is there no standard precaution we can take, no shots?"

The doctor was pitying. "You can't have formulated shots against something you don't know what is, can you?"

"Well we can't just sit here and do nothing," Strustle exclaimed, "there must be some steps we can take. Surely there's some . . . some positive action we can initiate, screening, testing, sterilizing . . ."

"It takes people," the doctor said shortly. He hefted his slim bag. "You've left it late, but you could still try to recover some of the lost ground by setting loose those people that you would keep stifled unaware. Your stupid selfishness could kill you. The brain that could perhaps save us," he sounded bitter, "is,

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thanks to you, locked in blissful narcosis."

The doctor stepped to the door. "This happens once, it can happen again. Where do you think you are—within a hoot and a holler of the World Health Organization?" He opened the door.

"Wait! Hell, come on now, we can't just leave it at that. What are we to do, man?"

"It's your responsibility—Captain." And the doctor sardonically suggested, "If you asked Mr. Punter nicely, he just might help you get your static public out of hock. However, whether it will be in time to substantially salvage your colossal foul-up is something I'd not care to guess at. Good-day, Captain. Oh," he paused at the door, "and I don't have to advise you, do I, of the unwisdom of approaching too close to the patient? . . ."

Punter said, "We have no idea how long the incubation period might be, and it might even have begun from the moment we set foot ashore. Captain Strustle, our choices are so limited as to be almost negligible."

"I know, I know," Strustle raised fending hands to protect his belligerence, "we need all the help we can get, especially from trained people and variously skilled professionals, all right. But I'm still boss, huh? remember that. Don't you forget that."

"Five women afflicted so far, and almost certain to be more tomorrow, I've never seen anything so swift or virulent," Punter worried. "They're so terribly distressed—Captain, community survival is at stake."

"I know that," Strustle snarled. "Think I'm blind? Think I'm stupid?" He pointed, "There's a chance they could get over it though, isn't there, huh? It might not be so fatal, might it? Isn't that right?"

"Do you want to sit back and wait and see?" Punter quizzed. "My God, you cannot be so inhuman. And," he added, "you cannot be so disinterested in your own welfare."

"Mine? *I'm* not sick."

"Do you think you're invulnerable? You're trapped here, Captain, trapped with the rest of us. Whatever the germs might be, you've been exposed to them, and they'll be beyond escape in your system now. The time will inevitably come when you will require your turn of what maximum of community aid there can be made available. No man can avoid this, Captain."

"I am the master here," Strustle repeated loudly. "I *am*. And I will get the best that there is."

"If the best, and the producers of the best, are all unconscious, they are not then to be well able to concern themselves with your physical partialities, are they?" Punter argued. "And there is another thing, another facet which is much more ominous."

"Yes?" Strustle's head jerked up. "Well? Well, what is it?"

Punter frowned. "Over our long journey here, we were sealed and

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most stringently guarded against contaminants. However, lately this seal has been severally broken, and the most rigid precautions against microbial invasion have not been put into effect, have they? Cycles have been ruptured and bypassed, and there has been unavoidable leakage of atmosphere into the group packages."

Strustle rubbed flat palms, weighing. "This is a tragedy? A little seepage one way or the other?"

"We are not in vacuum now, Captain," Punter remonstrated. "The suspended state was not intended to be prolonged once entry had been made into a selected acceptable environment. The suspended state has security just so long as its housing chambers remain unbreached. Such security has been forfeited here. Micro-organisms even now may be proliferating to irrevocably damage those helpless bodies that you have caused to remain insensible. Fungus spores, larvae, bacteria, these people become ever more vulnerable to irreversible damage with every day, every hour, that their summoning is withheld."

Strustle was too young to have a tic, but he got one anyway. "You're exaggerating," he claimed. "They'll keep forever."

"They won't, not after your taking chances interrupting the temperature balance. Don't you think it significant that this crop of female victims have all been recent releases? Not I, not anyone, will answer to the con-

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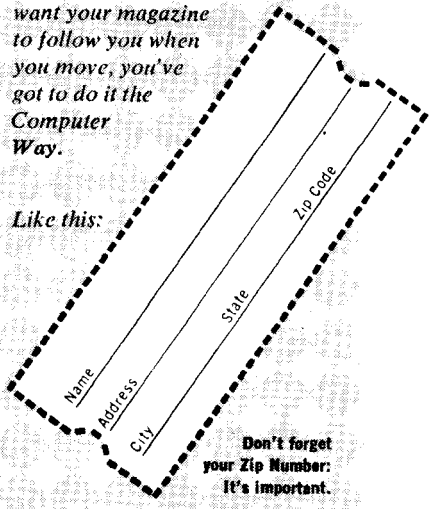

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sequences if you persist and try to confine these people for another month, for another week, or even for so much as another day."

"Are you trying to dictate to me, Punter?" Strustle grated. "I am the one who gives the word."

"Then they will rot on your hands," Punter shouted, "think of that! Is that what you want, Grand Captain? To be lord over cripples and the stinking dead?"

"I'll release them, release them then!" Strustle shouted in return. "Release them all—all except those on the Committee. I am master here, and I shall remain master here. The committee members can stay, and if they rot, they rot. And also," he spat, "Aymelite stays in there."

Strustle braced himself, placed feet apart, to reassert his dominance. "You can have them all, except the committee members and Aymelite." He flicked fingers, dismissing. "See to it . . ."

"Glober, you're in trouble," Punter remarked amiably. They had cycled out well over half of the human cargo that had been kept benumbed.

Glober was cautious. "I only obey orders, sir, those of the highest authority."

"That won't wash, Glober," Beverley chided. "You have consciously been aiding a revealed megalomaniac to achieve his ambition, to the deliberate imperilment of a thousand lives."

"I have taken the greatest care at all times to maintain the purity of conditions," Glober defended. "In my opinion the risk of contamination has been very slight. At no time have I intentionally done anything that might impair the hopes for survival of any individual."

"When these people wake up, *really* wake up, do you think they are going to credit your excuses?" Punter wagged his head. "No. Denunciation will be the order of this day. And I don't have to tell you, you're going to be asked questions that you won't be able to happily answer, not without sympathetic support."

Sergeant Bahmedin warned, "Leave him alone. He's doing like the chief said, that's all. Just get on with it."

"Uhuh, so you're still insisting on keeping your eyes shut, too, eh? My friend sergeant," Punter said, "this man you call chief is shortly to be relieved of his office. These people we are now bringing out are the cream of pioneering potential, the upper strata. They are too many now to be intimidated by the likes of you."

"Yes?"

"Yes, Sergeant," Punter said firmly. "Would you rely on a handful of unsettled militia? Our young captain is hereby unleashing competition and brains beyond his scope to contest or contain in subjugation. Too much at once, any hopes he had are knocked cockeyed."

"That's what you think, is it?"

"That's what I know, Sergeant.

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He's finished, it's all over. Would you actually go so far as to kill on his behalf, for this strutting little would-be despot? Take another look at the odds, Sergeant, and also take another look to see what the reins are made of.

"Ah," Punter halted before the next chamber door, checked the indicators, "two committee members in here." He looked hard at Glober, very solemnly at Sergeant Bahmedin "I am sure that they will be willing to overlook errors made through misguidance, and to let bygones be bygones, eh?"

Sergeant Bahmedin in turn gazed hard at Glober. Glober wore light perspiration. The trumps were lost to deuces wild. He bent his head, conceding. "It's been a quandary for me. I'm . . . glad it's over."

Bahmedin lingered. Then, "Okay," he said. But his regret was unconcealed when he added, "I knew it was too good to last . . ."

"The excess of the old sex hormones worked wonders," Mrs Aymelite noted, "but it's not at all the kind of itch I'd care to suffer again."

"That guy sure had one sweet nerve," Babe Aymelite marveled gruffly. "Doling us out as a steady ration to feed his ego."

"It was tricky," Punter confessed, "it was touch-and-go there for a while. I thought I might really have to see him killed."

"You wouldn't have," Beverley was only half dubious, "would you?"

"My dear, he had control in his restricted circle, and within this narrow gauge he was in position to give orders and make them stick. In such a tight, more-or-less family enclave, removal of the head would have left the way clear for the entry of rationality, which I am confident I could have conveyed—adequately enough."

"I'm sure," Aymelite growled. "I'd have screwed the bastard's head off as soon as he opened his mouth."

"No offense, but easier said than done," Punter differed. "Like I said, it was tricky—a mentally unbalanced person always is. He did not have a corresponding conscience, or a need for such strong justification to kill. Just fortunately he still had some way to go to plumb the more vicious depths of autocracy. But it was incipient in him."

"Incidentally, where is he now?" Aymelite asked, "straitjacket? Or has he been sensibly, quietly garroted and fed to the fishes?"

"Neither." Punter coughed. "It's hardly a way to start a new colony, with a capital punishment or a mercy killing. On the other hand, we have not and should not desire to so soon begin a prison service, and likewise we have at present no institutional facilities suitable for treating him."

After waiting a moment for more, Aymelite wanted to know, "What have they done with him then?"

"They, ah . . . c'hm . . . we've . . ." Punter self-deprecatingly shrugged, "put him into suspension, uh, until such time, hm-m-m . . . ?"■

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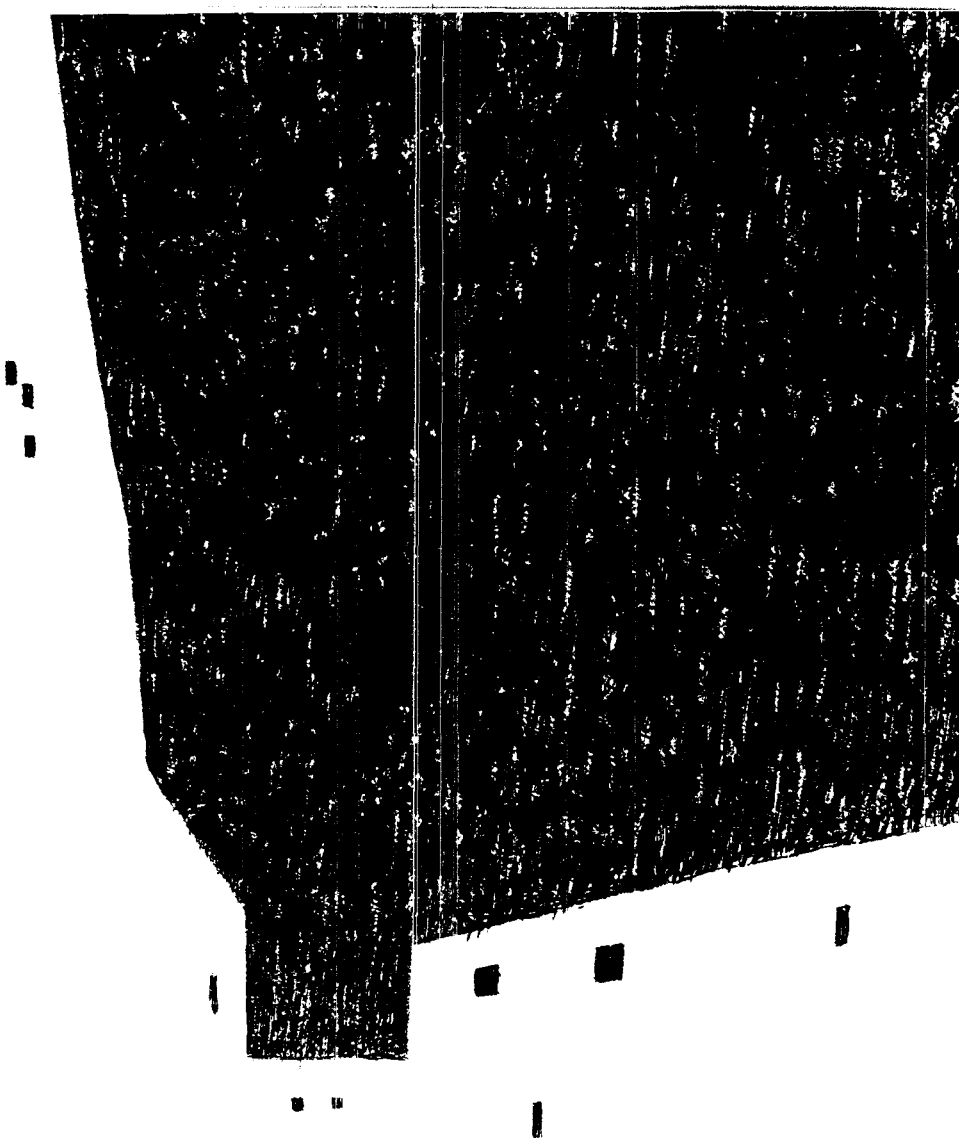

As Albert Einstein once noted:
Nuclear physics is much simpler than politics.

WADE CURTIS

power to the people

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Terrazo scratched in the sterile sand, muttering curses to the older gods before quickly thinking better of that and crossing himself. The Umfundis had warned him about that, and now that his body was lost to this awful place, he must be even more careful of his soul. He dug out furrows and planted seeds, muttering again. Nothing would grow here in the Namib Desert! Even Father George who was a saint could not pray up enough rain, and the land was barren, the white men must know that . . .

It had been bad enough in Walvis Bay where Father George had his last mission. But now to be sent here, hundreds of miles from any town, where there were no people, only a corrugated iron and fiber glass church and rows of prefabricated barracks with no one in them, it was more than he could bear. When he had first been given the job as sexton to Father George he had been proud. It was a good position, there would always be enough to eat. But the Umfundis had been sane then. Now he was quite obviously mad, to bring Terrazo into this desert where there was no water and never would be . . .

He finished the vegetable garden Father had told him to plant behind the church. "There will be water, Terrazo," Father had told him. Terrazo shook his head and went inside the church building. Dry baked heat tore at his lungs. Even Christ Himself must suffer in this! He genuflected to the altar, decided to let the dust stay in the pews until night although usually he polished everything at least once a day. The Lord would understand.

Outside again he looked across at the sea, waves pounding ceaselessly against the sandy beach. A cooler breeze sprang up and Terrazo stood gratefully in the shade of the church. A glint from the sea caught his eye and he looked out toward the horizon . . . something seemed to be out there, something bright and much too big. He shook his head. The heat could do that to a man. Deliberately he looked away, squinted across barren sands toward the mountains fifty miles inland. There was iron there, and lead, Father George had said, and men would mine it and send it here to the shore to be smelted and worked. And there would be farms here, and houses, a whole city. Terrazo shook his head again, the whites were mad, no one could ever live in the Namib, and who would want to if they could? But he was sexton to Father George, and he would show he was worthy of his post, perhaps some day he could persuade Father to go back to Walvis Bay where there were people to come to his church.

The glitter caught his eye again, it was closer now. Terrazo stared unbelievingly, crossed himself, and ran to the tiny parsonage fifty yards from the church, ran in terror screaming, "Father, Father, come quickly Father, there is a mountain coming across the sea!"

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Captain Rollo Anderson was paying careful attention to his charts. *Hrelsvelgor IV* was nearing her final anchorage, and had to be placed just right. He glanced at the speed indicators, nodded, and turned to the mate. "Signal 'Finished with engines'," he commanded, "and tell the reactor boys they better secure for earthquake. She'll come to ground in an hour."

"Aye aye, Skipper. I'll signal the tug, shall I?"

"Right, although I expect they know. But I want them standing by just in case the current's different from what I thought. We'll want to place the old girl just right . . ."

Anderson stood in a heated bridge compartment at the forward edge of an iceberg moving at nearly three knots. It had taken six months to bring the berg from the Antarctic to the African coast, and most of the crew was sick of it; now the voyage was over. She'd gouge out a hell of a hole when she went aground, big enough to form a harbor for ships coming to the Namib, or at least that's what the company engineers had calculated. Nobody ever tried making a harbor this way before, although Antarctic icebergs were standard sources of fresh water. Anderson had commanded three previous *Hrelsvelgors,* two to Los Angeles and one to Florida . . .

"Beacon bearing 20°," a cadet called from his post on top of the berg.

Anderson nodded. "Standby anchors," he ordered. He turned to his charts. Looked like good holding bottom here, and the depth sounder showed they were entering the hundred-fathom line. Tricky business—the anchors would be needed to hold the melting berg offshore after she grounded. He could drop them now, or let the tugs take them out later . . . "Drop stern one and two," he said softly.

The iceberg moved onward. Anderson decided she was drifting off course, had the tug push against her port side to hold her against the current. With the reactor shut down and secured against the coming jolt he had no power . . .

The depth finder pinged alarm. It was shoaling rapidly now. "Let go numbers four, five, and seven anchors! Tug clear away!" Anderson ordered. There was a long wait, one minute, two, then the first shudder, another, grinding fury as the iceberg slid inexorably across the bottom toward the shore. Steam boiled up from the ocean, steam and bubbles and mud as the four-mile-long mass ground to a halt.

"Not so bad," the mate said. "No worse shock than I thought."

"Reactor secure. All's safe," the bridge speaker announced.

"Anchors secure and holding fast."

"All motion stopped."

Anderson nodded in satisfaction. Just about where the Company wanted her, anyway. He began to unscrew the brass nameplate above

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the wheel. "Hoist the black ball, Mister," he told the mate. "And decommission the ship. She's not ours anymore . . ."

The executive jet whistled over the South Atlantic, dropping from its cruising altitude to a few hundred feet. It was almost to the African coast when Bill Adams looked up to see Courtney Graves' heart-shaped face and long blond hair. She smiled, then blushed slightly. Adams had chosen her as his executive assistant a year before, and so far that's all she'd been, but she could hope . . . only the man was married to his job! She wished he had time for something else, not that it had been all work these past months. Bill Adams knew about entertainment, and in their travels he took her to the most exotic shows in places no one had ever heard of. Sometimes he bought her presents . . . but that's all he did, and yet she knew he didn't have another girl, and his wife and daughter had left him ten years ago. His wife said she wanted a husband, not a visiting father . . .

Adams stretched, ran long fingers through sandy hair that kept falling over his pale blue eyes. Time for a haircut . . . "Got me some coffee, Courtney?"

"Yes, sir." She went forward to get it while Bill looked at the desolate African coast. The Namib Desert, said to be one of the bleakest places on earth. Sure is, he thought. He looked ahead for the station.

The iceberg was the first thing he could see. Partly melted now, it was still huge, three miles of ice angling out from the shore. One end of the berg was aground, the other held offshore by anchors, creating a quiet, protected deep-water harbor gouged out by the berg's fury when it crashed ashore. Quite a concept, Adams thought. Too bad we can't patent it.

Courtney brought him the coffee and sat opposite to face him. Nice kid, he thought. Too nice for casual affairs. Besides, she reminded him of his daughter and was the best assistant he'd ever had. Strong on the technical stuff, didn't pay enough attention to important matters like finance, but she was learning. Give her a couple of years, she'd be ready to take on a job as an independent troubleshooter for Nuclear General. Then, when she wasn't working directly for him, maybe . . . only then he'd probably never see her.

"Looks like they're coming along nicely," she said. "Of course, we saw it all from the satellite pictures, but . . ."

"Yeah. The real thing's always a little realer, if you know what I mean. Tell me what I'm seeing."

"Yes, sir." She shook her head slightly, rippling long blond curls. Bill Adams was undoubtedly the most brilliant man she'd ever met, but he acted as if he didn't know much. Sometimes he didn't, either. You could never tell when he was fishing for information and when he

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had made a thorough study . . . "The big square color patches are the solar saltworks. Brines from the desalinization plants go in one of them, seawater in the others. It took a lot of plastic film to line the bottoms . . . the large buildings along one row of solar ponds are purification plants. Potassium, magnesium, phosphorus, portland cement, the things we can get from seawater. I. G. Farbenwerke runs that part of the station."

"Hm-m-m." Adams sipped his coffee. "Heard from von Alten yet?"

"Yes, sir. He's already at the station. So are most of the others."

"Good. Give 'em time to look things over. O.K., what's the rest of this gubbage?"

Courtney eyed him carefully. Just how much was he putting her on? As far as she knew he had never been a professor, he hardly had time for it since he wasn't yet forty, but sometimes he reminded her of one, asking questions to see if his staff had done their homework . . . but then he really might not know. He mostly studied financial reports—his favorite saying was, "Leave engineering to the engineers . . ."

"The things that look like railroad roundhouses are our reactors and seawater flash evaporators, the round ponds next to them are treatment pools where they precipitate out solids with the KOH-HCl process."

"What's that big complex near the runway?" Adams asked.

She nodded. "That's the Alice-Chalmers electrolysis cells. Ammonia synthesis next to it. And just beyond that, the pink concrete building, is the GE experimental steam-hydrogen process fertilizer plant. It's supposed to be a lot more efficient than Alice-Chalmers, but there are bugs."

The plane circled low over the desert as the pilots got landing instructions. Adams pointed as they banked steeply. "I see the railroad's working." With the electric ore train to bring the scale into focus he examined the rest of the station. He knew from the reports that the industrial complex stretched along nearly four kilometers of seacoast and three inland, and beyond the industrial buildings were three hundred thousand acres of land either under cultivation or being made ready for it. The irrigation grid was plainly visible, and bright red tractors moved between the pipelines. There were another fifty thousand acres of solar salt lakes and bittern ponds . . . Otjiwar Station was *big*, but for a billion dollars it *ought* to be big. "What's the crop now?" he asked, pointing to the tractors.

She took a sheaf of papers from her briefcase. "The crop phasing's pretty delicate," she told him. "Right now they're in the high-export-value pattern. Harvesting dry beans and cotton, planting winter wheat and potatoes behind the harvesters. This pattern uses the least water, but the government wants them to switch to a high-calorie system so they can

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make exports to Rondizi . . ."

"Yeah, I know," Adams said. His voice was harsh. "They call it foreign aid. I call it danegeld. That's why we're here."

Adams climbed down from the sleek executive jet and mopped his brow immediately. Heat shimmers rose from the cement runway. "My God, it's hot here!" he said to the man waiting below the ramp. "Excuse me, Father . . ."

Father George Percy grinned. "If you want to tell the Almighty something that must be quite obvious to Him, that's your affair." Father Percy was a short, heavy man with no trace of fat but broad shoulders and thick arms. He wore white trousers and shirt with clerical collar, a small gold cross on a chain around his neck, and his accent was the heavy modified British of South Africa. "Have a good flight?"

"Good enough." Adams mopped his brow again. The handkerchief was soaked.

"It's best we get inside," the priest told him. "Aren't your people coming?" He led the way to a waiting jeep, held the door for Adams.

"There's just the one, and she wants to look at the phosphorus plant," Adams said. "I let Courtney run around these places on her own. She might find out something. Let's go, I want to see Jeff."

"He's in his office. Lot of work for the station chief. I told him I'd meet your plane." The priest studied Adams closely. He'd only met this sandy-haired American once before. It wouldn't do to get Mr. Franklin in more trouble than he was in, Jefferson was a good man . . .

"Quit worrying," Adams said, reading his thoughts. "There are standing orders all through the Company that station chiefs aren't to meet my plane. You're not very familiar with Nuclear General, are you, Father?"

"No. When the Mission Society put me here as their representative I tried to get out. I'm only a missionary, Mr. Adams. I don't belong on something as technical as this."

They were driving across the shimmering runway toward a group of concrete and fiber glass buildings at its edge. The big domes of the nuclear reactors towered over the administration buildings, and beyond them were barracks for the four thousand natives and five hundred foreign technicians living at Otjiwar Station. Next year there would be more than forty thousand people here—if the station survived, Adams added to himself. It seemed problematical.

Even through dark glasses and white pith helmet his eyeballs and head felt baked. Wouldn't they ever get to the air-conditioned buildings? The station was *big,* they'd been driving for several minutes now . . . "How do you like it here, Father?"

"I've been in worse places. We even have air-conditioning in the church and some of the houses! But I

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fear it's a waste of power, and I really shouldn't use mine."

"Trivial waste, Father," Adams said. "Giving the farm workers air-conditioning increases production, cuts down on their water consumption. Besides, we pipe the heat from the air-conditioning units into the solar evaporators, so we don't lose much." Except to envy, he added to himself. And that might be the biggest loss of all . . .

The jeep pulled up at the glaring white administration building. The native driver leaped from his seat to open the doors for Adams and the priest, and another uniformed guard examined their identification before waving them to the elevators.

They went to the top of the four-story building, past a miniskirted European secretary to Jefferson Franklin's office. The station chief was in shirtsleeves, his collar open. Franklin stood at a draftsman's table across the room from his desk. His black skin glistened with sweat, and his face contorted with emotion as he shouted at a white man. "I don't care what the Prime Minister says! I can't switch crops. It takes almost two hundred gallons of water a day to grow food for one man with *this* crop pattern, and I can't afford the water for the high-calorie system. So stop bothering me about it, Mr. Bloomfort!"

"The desalinization equipment works splendidly, I've seen it," Bloomfort replied. He was a short dumpy man with beads of sweat standing out above his small brown moustache. Both men looked as if they were out in the plant area, not in an air-conditioned office. "The foreman says you won't give him enough power to operate at full capacity."

"Damn right I won't. I can't, I have the phosphate production to keep up! The freshwater plant runs at full capacity when the sun's up; we never intended to run it full time at peak." He glanced up. "Hi, Bill. Mr. Bloomfort, this is Bill Adams, Special Assistant to the Chairman of Nuclear General. Bill, Anton Bloomfort, Undersecretary of the Interior."

As Adams and the politician shook hands, Franklin continued, "Maybe you can talk some sense into him, Bill. I can't. He wants us to change to ten-crop or high-calorie so they'll have something to give Ifnoka."

"We must give him food," Bloomfort said. "He has an army and threatens to invade. Their sabotage has cost us much already."

Adams nodded grimly. "That's why I'm here. Tell me about this Ifnoka."

"He is Chairman of the African People's Union," Bloomfort replied. "Although Premier Tsandi does not care for him, Ifnoka controls the army in Rondizi, and his party is strong in Botswana. He has followers in the Republic of South Africa, and some here . . ."

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"And what's he want?" Adams prompted.

"He says food for Rondizi. Ultimately . . ." the politician's half smile melted to a grim mask.

"Ultimately, he wants Otjiwar!" Jeff Franklin said.

"I've heard." Adams nodded, turned to Bloomfort and the priest. "I've only just arrived, give me a few hours, will you?" Humph, he thought. Only a half hour and I'm already picking up that clipped British speech pattern. "Father, can you take Mr. Bloomfort wherever he wants to go?"

Father Percy smiled. "What you're saying is can we get out of the way so you can talk to your station chief in private. Of course. I'll see you later, Mr. Adams. Dinner with the Bishop and me perhaps?"

"Thank you, yes . . ." Adams waited until the others had left the room. "O.K., Jeff, give it to me straight."

"It's simple enough," Franklin told him. He ran stubby black fingers through close-cropped tangled hair. "I can't handle it. I thought I could, Bill, I really did, but I can't. O.K., so you wanted a black man as station chief here. Looked like a good idea at the time. But that's what you're here for, isn't it? To yank me?"

"Crap." Franklin looked up, surprised. "You think we put you in here because you're black? If I'd had a better white man I'd have put him here. MacRea's on Tonga, Martinez is a sea farmer. Horton's—the hell with it. I'm not running through the list. Mr. Lewis put you here because I thought you were the best man for the job, so stop feeling sorry for yourself and tell me what you can't handle."

"Yes, sir." Franklin looked at Adams quizzically. Adams grinned.

"I'll also fire you the instant I think you can't handle it."

"Yeah." Franklin turned to the draftsman's table. "Technically we're pretty good despite the sabotage. Only minor stuff anyway, tractors, some pumps and waterlines, nothing we can't fix. They don't want to hurt the station, they want it intact." He pointed to the blueprints. "Farms are laid out, getting a crop from eighty thousand acres. Not as good yields as we'll get later—it takes time to condition soil as poor as this, and the workers are only learning how it's done—Bill, they don't know anything! If it wasn't for the Mission schools, we'd be in *real* trouble; our schools are set up to take people at a little higher level than we've got."

Adams nodded. "I'll tell Courtney we need some of those Sesame-Street-type T.V. tapes. Got T.V. in all the family quarters yet? Make sure you do."

Franklin made a note on a scratch pad. "Computer's got the usual bugs," he said. "Had to plug some problems through Santa Barbara—our communications satellite came in handy. Weather's held good, hotter than we expected so we get plenty

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of evaporation, portland cement and magnesium production are up twenty percent over predicted . . ."

"How'd the harbor work? Captain Anderson was worried."

"Rollo always worries that he's put one of those bergs a millimeter off. No sweat, and she's melting fine in this sun. If I had four more I wouldn't have a water shortage. Bill, if it wasn't for the sabotage and government pressure I'd be fine."

Adams shook his head. "Finances are close, Jeff. Which puts Meissner and some of the other backers in a mood to cut their losses. The riots in Nigeria aren't helping them decide to sink more money in Africa either. They may bail on us, Jeff."

Franklin whistled. "What happens then?"

Adams shook his head again. "Bad. The Old Man can't finance this deal alone, it's too big. We'll come out all right if we get the plutonium production up, but the whole integrated agro-industry concept is on trial here. You know what happens if you're on your own better than I do . . ."

They were interrupted by a knock. Courtney Graves came into the room, her long blond hair in a tangled swirl, her white blouse soaked. "It's *hot* out there. Hello, Mr. Franklin."

"Hi Courtney . . . Look, Bill, if Farbenwerke and Krupp bail on us, we're *dead.* It takes about a grand an acre to develop the farms, and sure, some of that's fixed cost we've already hacked but it's still about seven hundred and fifty dollars an acre from here to the end."

"A hundred and sixty million dollars," Courtney said quickly before Adams could take out his slide rule. He never could do figures in his head. "But that's not the real problem, is it, Mr. Franklin?"

Jefferson Franklin shook his head. "No. The chemical works, fertilizer production, electrolyzers—everything was built modular, and we're just about to capacity with what we've got. We need the new units the backers were sending in. I'm not even sure Nuclear General can recover the investment if we can't finish the project . . . it all depended on the integration, power and heat and water and everything phased in just right, and it takes a damn big scale for it to be economical . . ."

"Instant industrialization," Courtney finished. "The only industry in this country. It's just *got* to work! These people have *nothing* without us . . ."

"This is not a venture in altruism," Adams reminded her.

"It is for the World Mission Society," she retorted.

"We're trying," Franklin said. "When the World Court made South Africa turn Mbondi loose, the South Africans were pretty generous by their lights. Gave Mbondi twenty-four million bucks, that's about forty dollars a head, just about the annual income. Loaned them another ten million on a long-term, low-interest

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deal. And that's *all* these people have got. They sank every penny in Otjiwar, no wonder they worry about Ifnoka. And look, even in the fertile parts of this country it takes fifty, a hundred, sometimes two hundred acres to feed a man."

"How're you doing here?" Adams asked.

"Current production, we can feed ten people an acre. That's using two thousand gallons of water per acre a day. We've also got enough power to make the fertilizers, and some chemicals and cement for construction and export. I can feed the whole population of Mbondi and still have surplus cash crops to sell Israel . . . or I could before this mess started, anyway."

Adams found the coffeepot behind the drafting table's console. "Tell me about this refugee situation."

"Over a hundred thousand have come in. Ifnoka encourages them, tells them they'll get jobs, the good life, money—and we can't give it to them. They stream into the cities and make trouble for the government. Even though they get more here than where they came from, it's not enough . . ."

"Yeah." Adams was grim. "That's when people usually riot, when they're getting more but not as much as they expected." He poured coffee.

"Where do they come from?" Courtney asked.

"God knows," Jeff told her. "The Republic. Botswana. Rondizi. All over Africa, I think. Jesus, Bill, I don't know what to do, and Father Percy's no help. He says feed them, never mind the cost."

"You can't solve famine by feeding people," Adams intoned. "First principle of ecology. If you can't make people self-sufficient, your relief does more harm than good. O.K., that's about ten thousand acres, another ten million bucks investment to expand—can you do it?"

Franklin went to his desk, moved a lever. A console pivoted up from the desk top, and he punched at its buttons for a moment. "Won't take ten million," he said. "I can expand another ten thousand acres for about seven. Costs us up to three percent of our chemical export capacity, though, and there'll be no reserve power left at *all*. And what good is it, Bill? There'll just be more of 'em. Ifnoka makes it sound like this is paradise."

"Leave that to me," Adams said. "O.K., I want to look at the figures and digest your reports. Loan me an office, I need a console and a phone . . . Oh, yes. Invite Ifnoka and what's-his-name, Premier Tsandi of Rondizi to the conference."

"They won't come," Franklin said.

"They'll come. Ifnoka *asked* to come. I got the message relayed from Santa Barbara. Tsandi's scared to let Ifnoka make deals without him. They'll be here."

The conference room was crowded. In addition to a dozen men at the long table, more sat in chairs

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or stood at the end of the paneled room. Bill Adams took his place at the head of the table, nodded to the group.

It was quite an assembly. Harrison of Alice-Chalmers, Feldstein from General Foods, Meissner of the Bayer Kartel, von Alten of I.G. Farbenwerke . . . over in one corner Father Percy sat with a small graying man in black clerical clothing. The Bishop of Exeter, representing the World Mission Society. The orthodox church sponsors included both the Romans and Anglicans, as well as Coptics and Byzantines, and among them they'd raised two hundred million dollars, making their investment second only to Nuclear General's.

Ifnoka sat at the other end of the table. He was a tall man, brown rather than black, and wore green robes trimmed with gold. The garb made Courtney smile, but carefully. Ifnoka had been born Henry Carter of Canton, Ohio, educated in the U.S.A., took advantage of the Emigrant Act of '82. Five hundred dollars and a one-way ticket anywhere you wanted, just renounce your U.S. citizenship and residency rights forever . . . handsome enough man, she thought. Tall, slim . . . but cold, staring at Bill Adams with hatred. The man next to Ifnoka was dressed in western business clothes. Francis Tsandi, Premier of Rondizi. His Freedom Party ruled that country, but Ifnoka's African People's Union controlled the army and most of the weapons. China wanted a foothold in Rondizi, but so far Tsandi had resisted them as thoroughly as he'd resisted the Western Bloc. Couldn't possibly last long, Courtney thought. But she noted that Adams greeted Tsandi warmly although he had only a perfunctory handshake for Ifnoka. Now just what did the boss have in mind . . .

Adams cleared his throat. "Let's skip formalities and start at the beginning. When this consortium first planned the agro-industrial complex, we'd intended to put it on either the west coast of Australia or the Rann of Kutch. It looked like maximum profits in those areas."

"And I still say we should have gone to Australia," an Oxford-accented voice said from the left side of the table. "There wouldn't have been any political problems. British Overseas Investments . . ."

"Argued very well for a Commonwealth site, Sir James," Adams finished for him. "But the limiting factor was money, and the price of money is up to twelve percent. When Southwest Africa and the Mission Society made their offers, you all agreed."

"Ja, ja, we agreed, it is no time for what might have been," von Alten said. He didn't look at all like a Prussian aristocrat, in fact reminded Courtney of a sausage shopkeeper. The appearance was deceiving; von Alten held nearly the same position with Farbenwerke as Adams did with Nuclear General, and spoke for

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most of the Common Market investors. "While we are discussing trivia, you will please tell us why we must hold this meeting in Otjiwar? You have brought us here for what, that we cannot do in Geneva?"

"I think it's well to see the stations, Herr von Alten," Adams said smoothly. "Gives the investors a chance to see what our people are faced with firsthand."

"What your people are faced with I do not know," the German said. "But we are faced with losing a lot of money. We have contracts to deliver phosphates and potassium, and if we do not get them here we must buy on the world market."

Adams nodded.

"And I do not understand why it is that when only a small percent of the power of this station is diverted to agriculture my chemicals production falls by thirty-five percent!"

"If you're hearing complaints, General Foods is getting shorted on cereal deliveries," Feldstein said quickly. "And we have contracts with Israel . . . do you know the problems involved in trying to arrange transport through U.S. ports? We have the wheat, but the dock workers . . ."

"Greed." The single word cut through a rising babble. Ifnoka stood, walked to the window overlooking the harbor. "Greed. You talk of money, and out there are three ships loading with food and chemicals, bound for foreign ports and carrying with them the lifeblood of Africa! For what? To satisfy your greed!"

"Now just one moment, we . . ." von Alten began.

"Let him finish," Adams said.

Ifnoka sat again, resumed his dignified stare. "I can wait. Proceed."

As if it were *his* meeting, Courtney thought. But Adams was letting him get away with it . . .

"Courtney, if you please," Adams said.

She took her place at the chartboard behind Adams, lifted the pointer, stood for a moment to gather her thoughts. He's always letting me make presentations. Says it surprises people to find out how much I know, that they pay more attention to me than him, most of them being men . . .

"As most of you know," she began (Damn. Mr. Adams says *never* begin with that phrase), "the key to successful operations of this type is size. For a light-water reactor producing five hundred megawatts electrical the best internal return on investment is about six percent, overseas exports to the world market about half that. By increasing the size of power source to four thousand MWe we can get as high as twenty-five percent internal return, and over fourteen percent on the world market, but it requires an enormous capital investment."

"Actually, we don't need that much, do we?" Sir James Fortnum of British Overseas asked carefully.

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"Mbondi operates on internal return, and the Church can stagger along a couple of years with no return at all. Correct, your lordship?" he asked the Bishop.

"Correct for a few years, Sir James. But to raise this enormous sum we had to convince the donors that this is seed money to be recovered for other development work."

"Thank you, my lord," Courtney said. "I was just coming to that. But first, to answer Herr von Alten, the reason chemical production falls so sharply with small unscheduled increases in agricultural production is that this project is very carefully integrated. We can't process the brines without power which is being used for water . . . the chemicals are concentrated, Herr von Alten, but they are still in the bitterns."

"So my chemicals are only delayed?" von Alten asked.

Jeff Franklin answered. "Correct, sir, but the delay is long, because even if we have full power available it's already budgeted. It takes a while to catch up, and with more refugees pouring in demanding food and power . . ."

"Power to the people!" Ifnoka said quietly. Everyone stared at him but he didn't say anything else.

"I take it there's a point to this?" Adams looked to the end of the table at Joe Bentley of Bethlehem Steel. "You're warning us that this can happen to us all, is that right, Bill? We don't expect steel produc-

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tion for a year, but we've got contracts . . ."

"It could happen," Adams said.

"Then I'm authorized to tell you the station had better be prepared for delays in equipment deliveries," Bentley said carefully. "We can't afford to invest this heavily in a project that's already telling us it can't meet deadlines. Sorry, Bill, but that's the way it is."

"Und ve think hard about more investment anywhere in Afrika," Meissner, the Bayer Kartel man said heavily. "Next time by God ve go to some *civilized* place to put our monies in, ja?"

There was a chorus of muttered agreement around the table. then silence. Courtney began her technical briefing, but she could see it was no use. They'd made up their minds.

The paneled room seemed nearly empty, but there were still plenty of people in it. Adams, Franklin, Father Percy and the Bishop, von Alten for the Common Market, Joe Bentley for the U.S. companies. They waited after the others went to lunch. Courtney brought coffee and took her place at Bill Adams' left.

"Didn't mean to throw it at you like that, Bill," Joe Bentley said. "But it's true. The Board's never been enthusiastic about this goddam African venture to start with, even if there is good iron ore back in the hills and labor at reasonable costs . . . political situation's always seemed too damned unstable. Now you've proved it."

"Ja, ja, so what we didn't like has come to pass. What now? That's the question," von Alten said. He rubbed his fat hands together. "And I have seen Bill Adams too often pull the rabbits out of the empty hat before; what you have in mind?"

"First, I need an agreement," Bill said. "I've invited Ifnoka and Premier Tsandi to meet us informally without the others. Oh, Bloomfort will be here for Mbondi too. Now, I'm going to talk tough, and I need your backing. No wavering, gentlemen, none at all."

"How tough?" Father Percy asked. "Do you intend to threaten them? With force. weapons?"

Adams nodded. "Threaten them and mean it."

It's not going to work, Courtney thought. *The priests won't . . .*

"The Church can't accept that," Father Percy said.

"It can't?" Adams addressed the Bishop. "Tell me, my lord, what will the failure of Otjiwar do to your Mission plans?"

"Destroy them, of course," the Bishop said. "We'd hoped this station would be a model for the world. And once we'd recovered the investment here, we planned to build more stations like this in other parts of the undeveloped world. India, east Africa . . ."

"And instead you're willing to let a two-bit American hoodlum steal your investment and blow all those

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plans?" Jeff Franklin asked. "Make no mistake, Your Reverence, if Ifnoka gets his hands on Otjiwar he'll bring the Chinese in. Just what do you think they'll do for the people of Mbondi? Or anywhere else in Africa?"

"It had occurred to me," the Bishop said dryly. "Yet—the picture of the Church threatening people with weapons is hardly in keeping with our ideals."

"If you're willing to give up, I can't save a thing," Adams told them. "And you'll have condemned all these people to primitive conditions. What good are your schools without someplace for the graduates to work? Damn it, these agro-industrial complexes are the first serious attempt to do something lasting in black Africa, and if this one fails it'll be a long time before anyone else . . ."

"When I think of the money wasted in gifts here," Father Percy said. "Now, when there is something that might actually change their lives, we must make a profit on it or it won't happen. I find that as distressing as Ifnoka does."

"Don't let your heart bleed over Henry Carter," Jeff Franklin told them. "That bloody crook is only interested in power for himself, not the people."

"Haven't you missed the point?" Adams asked quietly. "The reason Nuclear General is exporting technology is simple: The political situation in the United States is abominable. Between the 'ecologists' and the anticapitalists we don't dare build a complex like this in Florida. We've all come to Africa in the hopes of making money, not to industrialize people."

Cruel, Courtney thought. But true enough. The World Mission Society could only raise a sum like two hundred million once. The big companies supporting the project put most of their risk capital here . . . if it were lost, no one would ever come back. And these people needed help . . .

"Well, gentlemen?" Adams asked. "Can I count on you? For silence, at least?" There was no answer from the clergymen. Finally Adams turned to Courtney. "Bring 'em in."

It was Ifnoka's turn. The project had been explained, the clergy had pledged Mission Society investments in Rondizi if they could recover their money from Otjiwar. Bloomfort promised police support for the station, and Franklin showed that Mbondi could handle the refugee population it already had, but not more. Now Ifnoka spoke.

As before, he went to the window. But he had noticed Premier Tsandi's interest in a station like Otjiwar for Rondizi, the man's obvious fear that the whites would pull out and leave Otjiwar unfinished, abandon Africa. A weak man, Tsandi. He would have to be replaced soon. The African People's Union was almost strong enough, there were only the Rondizi

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police to resist a coup. Tsandi had kept the army small, and though it was controlled by Ifnoka it would not be enough if the police resisted. But Tsandi was here in Mbondi, not at home. If he could be kept here and Ifnoka get word to Rondizi . . .

Meanwhile, talk. Henry Carter of Ohio was dead. There was only Ifnoka, the voice of his people. He pointed to the harbor. "The blood of Africa sails on those ships. Phosphates, grains, nitrates, fertilizers, cement, the things we must have. And you take them away for money! What Rondizi could do with them! And the food! But you dare tell us we must bleed our land to support your greed! It will not be. The food is here, the land is here, and the people will come here for what is theirs by right. Power to the people!"

He turned to Bloomfort. "Your Premier keeps you and the other whites, to belittle our people. You must go." Then to Jeff Franklin. "And you, traitor, you might have been a great leader of our people, but you are an American now, not African. They have made you an honorary white man, are you not proud?"

"What do you want?" Father Percy asked.

"Power to the people!"

"I see," Courtney said quietly. Everyone looked at her. "You mean one man, one vote, *once*."

Ifnoka's lip curled in contempt. "Woman" he sneered. He had nothing else to say to her.

"In other words you intend to bring enough of your Union people into Mbondi to overthrow the government here," Adams said carefully.

Ifnoka shrugged. "We might win an election . . ."

"And you'd nationalize the station." Adams shook a Camel from a battered pack. "Suppose we gave you the keys this afternoon and pulled out? What would you do? You can't finish Otjiwar, or even operate it."

"We have friends," Ifnoka said. "Good friends."

"The Chinese. I doubt they could finish this place, or would. But suppose they do, what does that do for 'the people'? Besides put them under your thumb. Your 'guided democracy' does a lot of guiding . . ."

"And yours does not? You hold up Amerika as a model for the world?"

Adams shrugged. "I'm holding up nothing. Your point, now it's my turn. First, that lifeblood you see out there. Where did it come from? This station is in the most desolate spot on earth. Sure, there'll be iron production in a few years, but for now all we use is sunlight, seawater, and power from our reactors. There's not a blasted thing of African origin on those ships and you know it."

Ifnoka shrugged. Courtney stared at Bill Adams. This wasn't like him, he never argued with people. But she saw that Premier Tsandi looked interested. If the whites could make all that wealth from nothing, what

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might they do with the resources of Rondizi? But he wavered, looked at Adams, then back to Ifnoka, shook his head as if to say that promises were nothing. And Otjiwar was here, here for the taking . . .

"Let us get to the point," Ifnoka said. "That is the purpose of this conference, to halt the strikes and infiltration, is it not? Well, I can do that for you. My price is a share in the management of the station. My officers to take control of security here. African People's Union trainees in all supervisory positions. And foodstuffs for disposal as I see fit. In return, you will be permitted to complete this plant and take out enough goods to pay for your investment. But no profits! Nothing for greed!"

Adams smiled thinly. When he spoke it was directly to Ifnoka, but he kept a wary eye on Premier Tsandi. I see, Courtney thought . . . but could he do it?

"Let me make you a solemn promise," Adams said. "Before anyone—anyone at all—takes control of this station away from us, there's going to be a regrettable nuclear accident. The only thing left of Otjiwar will be a pile of radioactive slag even less useful than the Namib was before we got here."

"Ja." von Alten nodded vigorously. "So, Mister Prime Minister Tsandi, you think on that for a while. With no station, you got all those people came here, others coming through your country to get here, and they got nothings to eat, ja? You think maybe they come looking for you with blood in their eye for sending them here?"

"Whereas, if you'll close your borders and stop this infiltration, Rondizi can benefit quite a lot," Adams finished smoothly. "You've got iron ore in your hills, more than Mbondi. It'll take a while to develop, but we can get a railroad in there to bring it here . . ."

"Why would you do that?" Tsandi asked. He saw Ifnoka's scowl, winced, but continued to look expectantly at Adams and von Alten.

"For profits, of course," von Alten said. "His Lordship the Bishop got other motives, but us, we want profits. We make you a pretty good deal to get them, too."

Tsandi nodded. *This* he could understand. But there was Ifnoka's Union group, and the coup he was undoubtedly planning in the army . . .

"Another thing," von Alten snorted. "Seems I got me forty, fifty thousand submachine guns. Some good automatic rifles, too. I wonder, Mister Prime Minister, if you want some of those guns for your own party people, for your police too, ja?"

"What?" The monosyllable was jerked from Tsandi's lips. He looked fearfully at Ifnoka.

"Ja, we got the guns," von Alten said. "Already in Rondizi we got them. When Mr. Adams says smuggle in guns to Rondizi, me, I do it. I think maybe we organize a coup,

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only now I see what he really wants, ja?"

Adams smiled tightly. "They can be distributed before either of you gentlemen get back to your capital. By the way, I'm sorry but the airfield's got some problems. Undermined by an aquifer, I understand. Unusable . . ."

"An aquifer?" Father Percy said carefully. He looked out at the barren desert. "I see." He suppressed a chuckle, but it was very loud in the still room.

"All you have to do is name the Cabinet people you want to distribute the guns," Adams said. "We'll see that they get them."

Ifnoka roared, charged out of the room. The door slammed behind him but didn't catch. Courtney went over to close it.

"Well, Mister Prime Minister?" Adams said. "Of course, we'd like your Minister of Trade to have a say in who gets those guns. Good man, that . . ."

"What do you want?" Tsandi demanded. His tone was listless, flat.

"For the guns?" von Alten asked.

"You can't arm Rondizi!" Bloomfort exploded. "What's to keep Tsandi from taking the guns and still getting together with Ifnoka? Using them against Mbondi?"

"Oh, he wouldn't do that," Adams said carefully. "Invasion of Mbondi's a dream anyway. The Republic of South Africa wouldn't care to see an actual armed invasion of their showpiece descendant. Infiltration's one thing, open war's quite another . . ."

"And who'd develop the iron ore?" Joe Bentley asked.

"Yeah. It does Rondizi no good." Adams stood at the head of the table. His smile was cordial and he spoke warmly to Tsandi, but Courtney saw his pale blue eyes were as cold as ice. "The Station was deliberately put a long way from cities. It won't fall to small arms. And everyone gains from the station except Ifnoka. His whole power structure's built on poverty and promises. Now we're not in business to eliminate poverty, but there's no way to make a profit without leaving money behind us, and that upsets him. For the Premier of Rondizi, though, the station's quite a good thing. What's it to be, sir? A chance to put Rondizi into the modern world, or life in Ifnoka's shadows forever?"

"I haven't even that choice," Tsandi said. "He's gone to order the military coup he's been planning for months. With me out of the country it will succeed."

Adams chuckled. "I wonder if Ifnoka's going to be surprised when he finds out somebody's broken the transmitter he brought with him . . ."

"And the telephone's out, too," Courtney said. She was sure it was.

"Somebody's been jamming the whole station," Jeff Franklin reported. "Strangest thing . . ."

"But we can get a signal through for our friends," Adams said. "Of course, your instructions for dis-

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tributing the weapons will upset the army. I'd suggest you ask your Minister of Trade to arrest the top Ifnoka people before they cause trouble, right?"

"And your price? Merely closing the borders?" Tsandi asked.

"Yeah, for the guns. But if you want Nuclear General and our combine to invest in Rondizi, you'll have to show enough political stability to convince the others. You heard the meeting."

"So that's why I was there," Tsandi mused. "You make a persuasive case."

Courtney held her breath. It was von Alten as much as Bill, she thought. Profits—Tsandi could understand that motive easily, but he distrusted altruism.

The door burst open. Ifnoka hurried in, his robes askew, a perplexed technician behind him. "What have you done?" he demanded.

Before Adams could answer, Tsandi stood. He looked at Ifnoka with contempt. "What they are doing, Henry Carter, is what you have demanded but never wanted." He pointed through the window to the huge reactors, the tractors and water pumps. The faint hum of turbines came even to this soundproofed room. "They are giving power to the people!" ■

James Schmitz is back with September's lead-off story, "The Symbiotes," another tale of the Psychology Service. This one deals with an interesting biological observation: the difference between a parasite and a symbiote depends pretty much on who's doing the defining! Trigger runs into three of the nastiest aliens on this side of the galaxy, who have formed a symbiotic relationship among themselves—so that they can literally make a little universe of their own in which they make all the rules.

There will also be two factual articles next month. L. Sprague de Camp will show us a bit of ancient technology, "The Iron Pillar of Delhi, which has baffled modern technologists. And Dr. Richard J. Rosa will show us a bit of future technology, in "How to Build a Flying Saucer," that might explain some baffling UFO observations.

There will also be part two of Gordon R. Dickson's "The Pritcher Mass," and—space permitting—stories by Christopher Anvil and several new writers.

THE EDITOR

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three-tour man

Some things no man can be held responsible [illegible]
but for some he must be held accountable
JOSEPH GREEN

"Here's why I called you in, Dale," said Jay Thompson, extending a printed form. The young personnel manager's smooth voice seemed less professionally pleasant than usual.

Dale Barber quickly scanned the filled-in parts of the paper. It was a standard application for a duty tour in Associated Unique Industries Plant 1. The sixty-six-hour work week and the fifty percent bonus at the end of a stint in the "Flying Fac-

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tory" made assignments there highly desirable. Dale saw nothing unusual about this request of electronic technician Reubin Fox . . . until he reached the small box with the "Previous Tours" heading. It had been answered with a "2." The dates following indicated this would be the third consecutive three-month stay aloft, with only the mandatory month on Earth between stays.

"So Mr. Fox wants to be a three-tour man; he's greedy. We've had a few before," said Dale, as he handed back the form and accepted another. "Did he pass the physical?"

"Yes, although it was close, of course. He did his exercises very conscientiously while up there. But look at that psych profile carefully, Dale. Then put the facts together, and you'll see a pattern you should recognize by now."

Dale followed instructions. As the lone company investigator he was semiautonomous, but on Unique's organization chart his office was a subunit under "Personnel." Theoretically he worked for this polished, baby-faced son of one of the six company presidents who had combined divisions to form Associated Unique.

Reubin Fox had a two-year technical school degree in electronics. He was thirty-one, single, and the support of his widowed mother. His intelligence scores were mediocre, but he had a dogged perseverance that had carried him through his schooling. According to ratings by fellow employees Reubin was a quiet, with-

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drawn man, with few friends. Under the important "congeniality" factor he barely qualified for the Flying Factory. He had come from a welfare family living in Appalachia, as had Dale himself. The detective's interest grew stronger as he scanned the many smaller bits of data that dispassionately laid bare the inner core and basic fiber of this man. The pattern was forming, and he didn't need a degree in psychiatry to see it. Dale reviewed the major items. A request for a third consecutive tour, which carried the human body to about the maximum calcium loss the bones could safely stand; a capability in electronics; the deprived background. It added up to an unpleasant story that was already becoming old but unaccepted at Associated Unique.

"You think Reubin's trying to 'fox' his way into the usual shortcut to riches?" asked Dale. He wished he hadn't made the bad pun when Jay Thompson accorded it his middle-line professional smile.

"The head shrink brought the matter to my attention, Dale. I fully agree with his conclusion, but I don't have any justification to deny the man's request. What I *can* do is send you up on next week's shuttle, to try to 'catch him in the act,' as I think you people put it. I sincerely hope we're wrong, of course."

"I'll get to work on it," said Dale, and rose. He could not repress a sour smile as he left for his own seldom-used office. It was easy for someone like Jay Thompson to hope a poor slob like Reubin Fox was not attempting to make himself an illicit $200,000. Jay had never gone hungry, and the only winter chills he had suffered were at the ski slopes.

Dale spent the rest of the week helping the Unique attorney prepare a case against the last man he had caught. Very early Monday morning he kissed his wife and two sleeping children good-by—it might be weeks before he saw them again—and headed for Kennedy Airport. The Unique groundside finishing factories were in New Jersey, the corporate offices out of which he worked in Manhattan, and he lived on Long Island. He arrived just in time to board before the service tower moved back from the shuttle. If he had been late he would have been left. In order to rendezvous with the orbiting factory the awkward-looking craft had to lift precisely on time.

NASA operated the Space Transportation System, of which the shuttle was the largest item of hardware. The Flying Factory was visited on a weekly flight schedule. The government-owned research wheel, which rolled around the Earth three hundred miles above the equator, served as the transfer point for travelers going on to the small lunar research base. And two years before, in 1992, the first manned Mars expedition had departed on two vessels assembled in space adjacent to the

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wheel. A shuttle ride was the first step into space for every traveler.

The delta-shaped upper stage, as big as one of the old jet passenger planes, was locked to the back of a booster larger than the giant cargo aircraft. Both operated on hydrogen-oxygen rockets, had auxiliary jet engines for conventional flight, and landed like any other plane. But the launch was vertical, and always over water. Special facilities had been constructed at Kennedy International, and several other airports around the world, to launch the massive combination vehicle.

Dale surrendered his papers and boarded the upper stage, hoping the dark-brown contact lenses, brown hair and heavily tanned complexion were enough of a disguise. This would be his fourth topside investigation, and on the last one he had gone as his fair complexioned, sandy-red-haired self. Even the thick contacts, which were mandatory for him and the reason he was not in the space program, had been clear plastic over his own green eyes.

While still not routine, the ride into space did not have the thrill it had once possessed for Dale. The shuttle was windowless, and there was nothing to do but watch his fellow passengers. He quietly endured the six minutes of first-stage flight, felt the familiar sensation of lightness when the shuttle was released and the booster dropped away to fly back to Kennedy, and relaxed as best he could for the sixteen minutes of second-stage propulsion. At no time did acceleration exceed three gravities, and a healthy person could make the lift into a 280-mile orbit without undue strain.

Dale did enjoy listening to the excited talk of the first-timers among the fifteen passengers. They would learn soon enough that eleven hours a day, six days a week, was *work* . . . whether on the ground or in space. Getting personnel and material into and back from orbit was Unique's largest continuing expense. It was not economical to man more than a two-shift operation. The extremely high pay drew many people back a second time, but few asked for a third consecutive tour. And those who did not follow the prescribed exercise routines vigorously enough disqualified themselves anyway. That sixty-six hours a week in Zero-G could weaken improperly exercised legs beyond the safety limit.

The pilot threw a view of Plant 1 on the large TV screen at the front of the passenger cabin. The talk died away as the travelers, including Dale, watched the approach. Six 60-by-80-foot modules, launched separately and assembled in space, formed the great 480-foot-long central cylinder. Six more were attached at right angles, three to a side, by fifteen-foot-diameter connecting tunnels. The center two, which housed the crew's living and gravity-dependent recreational facilities, turned like a giant rotating dumbbell. The shuttle was moving toward one of

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the airlocks on each end of the main body. An incredibly bright sun glittered off the polished surfaces of heat reflectors, or was absorbed and vanished into the black metal skin covering internal heat sinks. Plant 1 was a strictly utilitarian facility, but it had a beauty of design and structure seldom matched in Earth-bound architecture.

Reubin Fox had been sitting behind Dale in the cabin. The detective got his first good look at the suspect as they crawled through the docking tunnel into the loading area. The technician was a tall, lean-bodied man, well endowed with stringy but hard muscles. His dark-red, sharply planed face came equipped with a large jaw and a reserved, deliberately neutral expression.

The new arrivals had only an hour to get settled in their tiny but comfortable individual cubicles before they were due to start their first shift. The rush to work was deliberate. An average of ten of the fifteen were making their first trip into space. Unique had a full-scale mockup of Plant 1 on the ground, but no training simulator could match the actual experience of weightlessness. Nor could it accustom a person to moving routinely from the average thirty percent gravity of the rotating living quarters to the Zero-G production facilities. Most found comfort in operating the familiar but demanding machines. They were a refuge from strangeness. It also helped them absorb the physical sensations of Zero-G slowly and easily, while their minds were elsewhere.

Dale's identity and true purpose were known only to the current manager, Tohiyo Yakama, whom he had not met. He was processed with the rest and reported to the crystal growth facility in Wing 2, where he had worked before. Reubin Fox was in the same room. At the moment they were on a large carbon whisker run, a process with which Dale was familiar. Everyone had been thoroughly trained on Earth, and was expected to be productive immediately. Within ten minutes he was in full control of his machine, concentrating on the tedious business of starting the cycle by pulling crystals from the melt without inducing dislocations. In an hour he had forgotten he was not actually a production worker. The task before him demanded his complete attention.

"Coffee an' roll?" asked a pleasant voice. Startled, Dale looked up from his viewplate, to find one of the kitchen helpers floating by his elbow. She was a short, sturdy girl with a round face and very black hair, dressed in the usual work outfit of a form-fitting pants suit. The reusable cup she was offering him was designed for Zero-G drinking, and the roll had to be extruded from a thin paper container, one bite at a time. Dale had forgotten the snack-breaks in the middle of each long work session. But it was real coffee, tasty

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food, and a nice-looking coffee girl. Some things never changed.

"New man? My name's Sheila Samberg; *not* Sandberg, *Sam*berg. I'll be by twice a day, and please save the cup for me. I see the foxy rube is back. Hi, old hick; how are you?"

Despite the words the tone was friendly. Reubin Fox looked up and smiled. "Hi, Sheila; I'm fine. This your last month?"

Dale hastily gave her his assumed name, and Sheila pulled herself along the guide rail to Reubin's station, dragging her bulky dispenser behind her. It was attached to the rail by a sliding clamp. "Yep, just one more month," she said cheerfully as she handed the technician his coffee. "I'll be back, though. Heck, I *like* it here!"

Dale had not realized how hungry he was until he smelled the roll. He ate quickly and returned to his work. Lunch was served hot in the cafeteria in one of the rotating wings, and then the workers faced the long second session. Only people who were willing to work hard were accepted for the Flying Factory. With the exception of hollow ball bearings and a few special metal or glass castings, everything produced in this factory had a low mass as individual units. Most items required extreme care during the production processes. The semi-conductor divisions produced crystals so pure their operating characteristics were radically different from similar items made on Earth. The optics section could handle castings up to forty inches, and the lenses and mirrors they produced were of far higher quality than those cast in gravity. Last year, the third operational one for Unique, the Flying Factory had exceeded a billion dollars in gross sales.

The six companies which had had the daring to invest three hundred million dollars each in space manufacturing, by pooling their space systems divisions to form Associated Unique, were proving to the stockholders that their managers had not been wild-eyed visionaries after all. Although they would be years paying off that huge capital investment, their profits ran close to twenty percent a year. And the money the U.S. government was making from its shuttle service was helping to pay the cost of developing the vehicles.

After dinner that evening most of the first shift met in the rec-room in the living quarters for "get acquainted" night. With an average turnover of fifteen people each week, the entire complement of one hundred ninety changed every three months, making most friendships or romances transitory. Reubin Fox, Dale noted, was perfunctorily greeted by several people, obviously acquaintances still here from his last tour. Sheila Samberg was there, dressed now in a wide-mesh knit jumpsuit that revealed a lot of skin-colored underwear. Among others Dale met Tohiyo Yakama, and at

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the first opportunity the small Japanese executive pulled the detective aside. He informed Dale that Reubin Fox was not very popular, but he had always been a good worker. The plant manager doubted the technician was trying to cheat on his employment agreement.

"I hope you're right, but we've had less than a dozen consecutive three-tour people to date," Dale answered. "In every case, when the shrink's staff said the man was probably stealing, they were proved correct. It looks so easy, and the temptation to make a big killing is so strong . . ." Dale shook his head. After a moment he added, "There have probably been small ones successfully smuggled out by two-tour people who were willing to settle for fifty thousand dollars or less. The ones like Reubin Fox, who are quiet but like to think they're very clever, don't realize that third consecutive tour is like waving a red flag in front of the psychiatrists."

While they were talking Reubin Fox quietly drifted out the door. It seemed unlikely he would be replacing his carbon electrode the very first night, but Dale decided he would take no chances. Hastily excusing himself, he followed the wiry Southerner.

Dale's sudden hope for a quick end to the case was doomed to disappointment. Reubin Fox entered the connecting tunnel to the main cylinder and started up the winding stairs, holding the center guide rail and smoothly transferring himself from walking to pulling as the artificial gravity of rotation faded. In the central open area he pulled himself along the handrails to the Zero-G rec-room. At the moment it was probably deserted, and Dale decided not to enter behind Reubin. The device, of whatever type the technician had made, was unlikely to be hidden there. Instead Dale turned around and went to his cubicle. It had been a long day, and he was very tired.

After a week of observation, Dale decided that catching Reubin Fox "in the act" was going to be difficult. The unsociable technician spent most of his free time in his cubicle, or on the exercise machines in both rec-rooms. But if Dale could detect a pattern in the suspect's movements, it might be possible to at least pinpoint the room in which the device was hidden. After that a thorough search would probably uncover it.

Dale used his master key one night when Reubin started his regular exercise routine, and carefully searched the man's tiny room. He did not expect to find the box, since it required the vacuum of space for operation, but he wanted to know more about Reubin Fox. All he learned was that the technician's taste in reading ran to science journals and pornography, a seemingly odd combination. Dale carefully replaced all items just as he had found them, and returned to his own quarters.

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On the second morning after the search Dale reported for work, pulled himself into the operator's chair, and reached for the seatbelt. With his free hand he grasped the control to adjust the focus of the viewfinder . . . and was snapped rigid with electric shock.

The knob had been wired to kill. That single thought flashed through Dale's mind before the current almost paralyzed brain as well as body. Some lingering fragment of self-possession, the safety training that had been drummed into him during his years in industry, remained. He knew not to attempt to lift the hand; the muscles involved would not obey him. He could not even cry out, since his trunk was the main path for the current. But he did still have some control over his legs, because the flow was from hand through chest to the metal seatback. He kicked convulsively against the bottom of his machine.

On Earth Dale would have died. In Zero-G the momentum imparted by the kick threw him back and upward, bouncing him off the seat, bending his trunk as he rose in the air. His hand was pulled away from the knob.

The low ceiling swung wildly before Dale's eyes as he flew toward it, still cartwheeling in the air, and then he hit on his back. He had a final glimpse of the innocent-appearing knob that had almost killed him, and then blackness blotted out the alarmed faces of his co-workers.

When Dale recovered his senses he was in the small clinic. With the return of consciousness came fear, and he cried aloud and tried to sit up. The Plant 1 doctor was by his side immediately, a soothing hand on his shoulder. "Easy there, fellow. Just relax. That was a close one, but you're all right now. You did get a touch of ventricular fibrillation, but I knocked it out in a hurry. Tomorrow you'll be as good as new."

Dale lay back, realizing that he was strapped in. The clinic was in the central cylinder, since Zero-G had therapeutic affects on a great many illnesses. The doctor was so young he seemed almost a juvenile; probably his first paid job after internship.

"One of the maintenance men and your buddy Fox checked the control that almost got you," the doctor went on. "Seems that a 220-volt wire worked loose on the inside and was lying against the shaft. Just a few seconds of that is all a man can take. Lucky for you your legs went into muscle spasm and kicked the machine, pushing you away."

Dale started to explain that he had retained enough sense to kick on purpose, but refrained. Instead he concentrated on a new thought. Unless that really had been an accident, which he gravely doubted, Reubin Fox was on to him. And the man from the Appalachian hills was willing to murder. Dale was saddened by the thought. He would not have expected Reubin to be a killer.

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It was two days later before Dale felt like returning to work. In the meantime he checked with the maintenance man who, with Reubin's help, had repaired the machine. Apparently a power supply wire had slipped out of an improperly tightened terminal and floated about until it made contact with a potential conductor. Dale's body had completed the circuit to ground. No one could explain how it had happened in the hour between shifts, but there was no possible way to prove it had not been an accident.

To Dale's pleased surprise, Sheila Samberg had visited him twice while he was in the clinic. She was one of the lowest-paid people in the Flying Factory, but her job took her everywhere and she knew everyone. She was also one of the few who liked Reubin Fox, and with whom he would spend any appreciable time.

There was a double-dance on the evening of every seventh day, which the production workers had off. Newcomers always met in the rec-room in the living quarters, where rotation held them to the floor for normal if extremely light-footed dancing. Many veterans preferred the more difficult but interesting free-form effects possible in the larger Zero-G rec-room in the main cylinder. The dances were popular, and had to be staged in shifts to accommodate everyone. Since males outnumbered females, girls could attend two shifts if they wished. Dale went to the dance held two days after he returned to work, in the second group of men. Sheila was in the free-form room, dancing with Reubin Fox. She was wearing a bell-bottomed pants suit of semitransparent material, and looked very attractive.

Reubin was an inexperienced Zero-G dancer despite his two tours aloft, but Sheila was excellent. Dale watched, amused, as they kicked off the padded walls and met in the center, to lock arms and convert forward momentum to spin. They broke apart, twisted, placed the bottoms of their feet together, and pushed each other toward the walls. Since there were about fourteen other couples doing the same things, mid-air collisions were frequent. The music was lively, the crowd congenial, and the bruises accepted in good humor. Alcohol and drugs were not allowed aloft, and many people were amazed to discover they could have an enjoyable evening without them.

Dale danced with two other women he knew, and eventually with Sheila. He had a relaxing, laughing good time for the two hours he was allowed, and noticed as he started to leave with Sheila that Reubin had vanished.

"Where did the old Fox go?" Dale asked as they headed for the cafeteria and a late snack.

"Oh, Reubin always leaves before he has to," said Sheila, sounding slightly miffed. "Sometimes I think he just comes to keep his congeniality rating up. He said some-

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thing about relieving his friend Sam Johnson for a while. Sam has duty in the vaccine room this evening, and Reubin used to work there. To heck with him. Tell me all about how you have a wife and six kids back on Earth, but we can have a beautiful two-week romance before I leave. You're almost as quiet as Reubin."

Dale grinned, and said, "Just two kids. And I wouldn't romance you because I like you too much."

Their food was slow in coming. Sheila left him at the table and went behind the counter to get it herself. Someone asked her to make a sundae while there, and she good-naturedly agreed. More people drifted in, more orders came, and there was only one girl actually on duty to fill them. Sheila found that she had involuntarily put herself to work. She threw Dale an apologetic glance, and shrugged. He waved, in acceptance of the situation, and left. But instead of going to his cubicle Dale headed for the biological labs in Wing 4, and the vaccine room.

The speed with which a bacterial culture grew was in direct proportion to the amount of oxygen each tiny living form received. On Earth it was difficult to distribute oxygen evenly throughout the fluid medium. The rising bubbles combined and became too large for good dispersion. In Zero-G it was possible to keep a constant flow of micron-sized bubbles moving from wall to wall in each fermenter. Another constant always present was noise. The vaccine room walls were sound absorbent, as were most of those in the Flying Factory, but the continual bubbling of liquids and hissing of air made it one of the less desirable places to work. At the moment Dale appreciated the sound. It enabled him to enter the room without being noticed, and slip between one of the larger fermenters and the wall when he saw Reubin and Sam Johnson talking at the central monitoring board.

Dale could not hear the words, but after a moment Sam pointed to one of the dials and the control below it, and Reubin nodded. Then the older man, whose voice indicated he came from the same part of America as Reubin, turned and started pulling himself along the guide rail. Dale moved back behind the fermenter. He would have been visible if the technician had turned his head after passing, but Sam went straight out the door, obviously headed for the dance.

His friend had hardly disappeared when Reubin pulled himself into the work area. He moved purposefully toward a large tank, one mounted to the curved wall. It contained the supply of liquid nutrient for most of the fermenters. Locking himself to the guide rail by his knees, the lean technician hung upside down and inserted a screwdriver between the tank and room wall, near the bottom. A foot-square section of plate came off in his hands.

Reubin Fox did not score highly on intelligence tests designed by men

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with superior educations, but he had a native shrewdness and inventiveness the tests would never show. Dale saw that a rubber bladder had been inserted and braced to form a dry cavity within the liquid. A six-inch square metal box took up most of the space. It was anchored by a quarter-inch pipe that led to the wall. There was a hand valve in the line. In Dale's mind there was no doubt that the pipe penetrated on to the outer wall, and that a tiny hole to space had been added to those known and authorized.

Reubin turned off the valve. With the hand tool he opened a sealing screw set in the wall of the box, and Dale heard a new hiss as air entered. What the technician was doing violated every safety rule on access to vacuum—even from where Dale was hidden he could see the valve was not of the approved type—and that alone was justification for dismissal. But this quiet man had done far more. He quickly removed four screws holding the front plate on the metal box, and Dale saw what he had spent two weeks in space to find.

Suspended near the center of the box's interior was a carbon-coated filament, two wires leading from its end into the nutrient tank and some hidden power source. In front of the filament, glued to a small wooden pedestal, was a rough round pebble as large as a pigeon egg.

But that round stone was not a normal pebble. Though it had little of the fire and splendor it would possess after cutting and polishing, enough light penetrated into the cavity for something of its great potential beauty to shine through. Dale was looking at a large rough diamond.

The mechanics were simple. Evaporated carbon, in a vacuum, could condense out as either graphite or diamond. The diamond form took more energy, but if a seed crystal was available and the graphite pattern was not, the hot carbon would assume the higher energy form. It was a slow process at first, since the crystal could absorb only a few atoms at a time, but over a period of months a tiny stone could be enlarged into a magnificent diamond. The larger the surface area available for deposition, the faster the growth rate. There was no known way to tell the Zero-G-grown diamond from those formed by heat and pressure in the ground, except that the former were always nearly perfect stones. A diamond nurtured for six months might bring $50,000 from an unscrupulous dealer. One grown for three consecutive three-month tours would always top $200,000.

Reubin inserted a new filament and repositioned it. Weekly movement of the emitter was necessary to ensure a well-shaped stone. Working quickly, he replaced the cover on the box and tightened the air-sealing screw. With a turn of the valve the small amount of air in the box rushed into space, leaving a vacuum difficult and expensive to achieve on

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Earth. Reubin replaced the external cover plate, and pulled himself back to the monitoring panel. During the next week his stone would grow in value by several thousand dollars, with no further effort on his part.

Diamond-growing was the oldest, most commonly tried way of cheating Associated Unique. The employee agreed when signing on not to use company facilities for private work. A separate, very strict legal agreement forbade making anything whatever of a personal nature in the Flying Factory. Employees were searched when arriving back on Earth, but there were many ingenious ways of hiding a small object like a diamond. They had been swallowed, hidden in the rectum, buried in carefully restored shoeheels . . . and probably many other ways still undiscovered. Quite a few, Dale felt certain, had gotten through.

Unique had the capability to produce large diamonds in such quantities any middle-income family could afford one. But flooding the market would also lower the value of existing stones, causing aggregate losses in the billions to present owners. The political pressures had been too great to resist. Unique was forbidden to produce even commercial diamonds for cutting tools.

Dale pushed himself away from the wall and floated toward the guide rail. Reubin Fox was facing his way. The detective saw surprise on the red face, followed by dismay as the technician realized he had been caught. And then the craggy features settled back into their usual reserve, and Dale could almost read his thoughts. The watcher had no camera. It would only be one man's word against another as to what he had seen Reubin doing. It was true that the technician had worked in this room on his first tour, when the diamond-maker had been built, but that was no proof he had done it. His hopes of making a small fortune were shattered, but at least they couldn't put him in jail for attempted theft.

Reubin's face twisted into an attempt at a smile. He managed to say, "Hello! What are you doing here, Dale?"

"Spying on you," Dale answered calmly. "I'm very sorry, but under the authority granted me under the laws of the United States, as incorporated in the Charter of Associated Unique Industries, Incorporated, you are under arrest. You have the right to remain silent. You . . ." he droned through the remainder of a suspect's safeguards, while Reubin waited with a smile that had gone twisted and sick.

"So you're a company dick. And maybe not a very good one, 'cause I saw you followin' me aroun'. Big deal. I don't think you got any proof, Mister. It'll be your word against mine in court."

"Not quite. You've forgotten one of the oldest proofs of all, Reubin, one that works as well in Zero-G as

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on Earth. That little vacuum box will be just covered with good fingerprints."

The technician's face reddened from a new surge of blood as he realized Dale was right. And then his right hand dipped into a pocket and emerged with the screwdriver. With his left one on the rail he flipped himself horizontal, braced both feet against the panel face, and shot toward the detective, the screwdriver held like a dagger. And it would make a very effective one.

Dale realized he had been somewhat foolhardy. He should have gotten help before confronting Reubin. The man had proven his willingness to kill when he wired two hundred twenty volts to that control knob. But it was too late for second thoughts. He also did an aerial flip and placed his feet to kick, using the only solid object available, the rail. The hurtling form was almost on him. Dale put all his strength into a desperate lunge away, and a stab by the narrow blade just missed as Reubin flew past below him. And then Dale realized he was heading for a fermenter, and tried to twist and impact on his hands. He was too late. The top of his head crashed into the hard steel wall, and white flashes flickered across a sudden blackness in front of his eyes.

Dale retained enough consciousness to feel himself bouncing away. He hit the ceiling, though with his rump and much more slowly, and then drifted horizontally, his muscles slack. Dimly he heard a loud voice crying *"It was for my mother!* She did without all her life, I could have given her . . . *I'll kill you!"*

Dale's eyes came into focus just in time to see a hard brown hand grasp him by the ankle, yanking him down. He tried desperately to lift his arms, to fight, but his muscles refused to obey. He saw Reubin's snarling face, the screwdriver drawn back to strike, and thought hazily that he was going to be killed by an odd weapon. And then a piercing scream rang through the vaccine room, one so loud it overwhelmed even the steady hissing and bubbling. Reubin, jarred, withheld the killing blow. Dale was facing the room's entrance. Just inside, staring at them down the length of the guide rail, was Sheila Samberg, still in her semi-transparent bell-bottomed pants suit.

Sheila threw her head back as if to scream again, and Reubin released Dale and started toward her. Then she did yell, but chopped it off and turned and pulled herself through the door. Reubin stopped, remembered he was holding the screwdriver like a weapon, glanced at it, and back at Dale. And then he tossed the tool toward the tank which held his diamond, in a gesture of disgust. Dale realized the technician had had no intention of harming Sheila.

Without another glance at the detective who had caught him, Reubin pulled himself out the door and vanished.

When his muscles were under con-

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trol again, Dale reached for the telephone on the monitoring panel and dialed the plant manager's cabin. It was unlikely Reubin Fox would attempt to hurt anyone, but his psych profile showed a disposition toward suicide. He would have to be protected against himself until he recovered his mental equilibrium.

An hour later Dale sat in his cubicle, having recovered enough to start his report to Jay Thompson. This was the part of his job he hated most. But the Monday morning shuttle would arrive in a few hours, and if this paperwork was ready he could go directly home from the airport instead of to his office.

The part of the form over which Dale always agonized was the "Charges" section. Reubin Fox could be tried and undoubtedly convicted of attempted murder. Or Dale could charge him with resisting arrest with violence, which carried a much lower penalty. Reubin would have stabbed him to death, if Sheila had not come to keep the technician company because of his supposed good deed. But Reubin would not have killed Sheila, one of the few people he regarded as a friend. Of that Dale felt certain. And once the lean man's rage had cooled, he had tossed the screwdriver away, rather than burying it in the still helpless detective.

Dale agonized a moment, thinking of Jay Thompson, the affluent executive who would read this report. To that scion of a wealthy family the motivations that had driven Reubin Fox to cheat and almost kill meant nothing. Jay would have the company attorney prosecute to the full extent of the charges.

Dale felt far more akin to the man he had caught than the one for whom he worked. Reubin Fox did not know it, but he too had an old mother living in Appalachia, and she also had done without all her life. And, unwittingly, she and Dale's now deceased father had deprived him of the one thing he wanted most. As a boy growing up in the Sixties, he had yearned with desperate earnestness to become an astronaut. But his poor and ignorant parents, when he was five, had let a severe case of trachoma go untreated for several months, irreparably damaging his eyes. He had gone into law enforcement instead, and again like Reubin, had had to settle for a two-year degree. This job with Unique was the closest he would ever come to fulfilling his boyhood dream.

Neither of them could help what had been done to them in childhood, but both men had been adults now for over a decade. And a grown man was responsible for his own actions. It was as an adult that the technician had become a thief, and had set an electrical trap that might well have killed a man.

Dale sighed, and charged Reubin Fox with attempted murder while resisting arrest. He and Reubin might both be children of Appalachia, but they had gone separate ways and become different men. ■

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Jack Gaughan

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Every benefit comes at a cost.
A stable government can be formed by a dictator.
And immortality can not only remove
the fear of death, it can erase the hope from life.

nanda

GARY ALAN RUSE

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Juan-Pablo Marcos watched the loving throngs press in upon the speaker's stand, not like people, but like flood tides rushing in to inundate the shore. Swelling waves of faces, ecstatic, beaming, groping for a treasured glimpse of the mighty one. Juan-Pablo sensed the raw power surging through the crowd, and was glad it was controlled power.

Santa Leona was a small city, like so many in the South American Federation of States. Never more than once in a decade could The President make a personal visit to such a city. The occasion was always greeted with fanatical enthusiasm.

And now it was time.

As The President moved forward to the front of the speaker's stand, someone cried out his name, then another and another, until the entire crowd had taken up the chant. "Nanda, Nan-da, Nan-da," they droned, over and over, until the sound began to hammer at Juan-Pablo's mind.

As Captain of The President's secret service he had seen the crowd reaction many times, but never had he become used to it. It was unnerving, even for one trained to avoid being swept up in the mass phenomenon. He was glad of his training, and looked with uneasy eyes upon the crowd, at the streets and alleyways beyond the landscaped plaza. And windows, so many windows, on all sides. Any one could have a rifle in it. Fantastically enough, there were still rebels, even after a hundred years and as many failures.

At a gesture from The President, the crowd ceased their chanting. They waited for his words.

The tall, imposing figure raised his arms to encompass them. "My people . . . thank you." The voice was magnificent. Its power reached out to every last man in the plaza.

"My people," he continued, "you who have supported me, you who have worked so hard to achieve the great glory of the Federation, it is *you* who deserve the cheers . . ."

There was renewed jubilation. The chanting began again, different this time. It was a monotone refrain known to every schoolchild. Juan-Pablo felt the words forming soundlessly in his mouth. "Nanda is good, Nanda is peace, Nanda is justice, Nanda is all . . ."

Again The President raised his hands, and the people were quiet. He was about to speak again when the angry murmurings began in the east end of the plaza. Murmurings that swiftly became an uproar.

Abruptly, a man leaped to the edge of the fountain not forty yards away from the speaker's stand, jerked something to his shoulder and aimed. His weapon flashed.

"Death to tyrants!" His scream of triumph was already tinged with fear and the knowledge of his own imminent doom.

The President fell, a thin column of smoke slowly issuing from the scorched dress uniform. It was all too fast, too brief to prevent.

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"The fool—" Juan-Pablo said, not in contempt, but in exasperation, "the stupid fool!"

His pistol was in his hand as the assassin and a handful of rebels fled. But there were no clear targets, only ripples in the mass of citizens standing still in mute horror.

Juan-Pablo put the weapon back in his holster, glad that the job was no longer his to do. The fleeing rebels had rushed blindly into the range of the secret service men stationed on the edge of the plaza. From their position on a high balcony, the guards' view was clear and their aim swift. Automatic weapons roared, sending fiery death into the plaza. Several of the crowd were hit as well, but such was their fate. A few might be sacrificed to preserve order.

As the screams died out, soldiers rushed in to remove the bodies. The rebels had committed the ultimate sin, and for their crime received justice both instantaneous and final.

Juan-Pablo turned to face the Capital airship. The gleaming craft rested on a crude airstrip a hundred yards behind the speaker's stand. Secret service men scrambled from the cargo hatch to claim the body of their fallen leader. The forward port was opening, and the stunned citizens waited for the miracle they knew would come.

Halfway back to the airship with their burden, the secret service men were passed by a tall imposing figure approaching the speaker's stand. One who in every way was the perfect image of the one being carried off.

The cheers began, slowly at first, then ever-increasing, as the figure ascended the steps of the speaker's stand and faced them. It began again, the chanting and the surge of raw energy.

Nanda, President of the South American Federation of States for the past one hundred years, smiled and reached out to the crowd.

"My people . . . thank you . . ."

The Capital was buzzing with stories of the latest assassination, and the swift justice for the rebels. Glowing praises for President Nanda and the greater glory of the Federation were the order of the day. An official affair was announced for the evening, to celebrate his new incarnation. It was the fourth in as many years.

Juan-Pablo switched off the afternoon news telecast. The silence which invaded his quarters was oppressive. He dreaded the "official affairs," dreaded them as much as the personal appearances which The President made, all too often. The Great Hall would be full of dignitaries, making pompous toasts and meaningless tributes. He could not understand them, any more than he could understand the rebels' insane determination in the face of certain failure.

The wall clock's time-signal reminded him it was four o'clock. It

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was his habit to inspect the vaults at four, when duty did not send him from the Capital.

He pulled on his tunic, plain blue in color, and adjusted the crest that was the symbol of his rank. A minor detail of his job, it was, but he welcomed the opportunity to leave the silence of his room.

The elevator, as always, was guarded. With swift progress it descended into the lower levels of the Capitol Building and into the underground vaults. Once, in the dim past, kings and presidents were buried here. Now, the vaults belonged to the future.

As the doors slid silently open, two guards blocked his way, then saluted briskly and let him pass. Juan-Pablo was in no mood for the momentary wait in the airlock while sensors scanned his person and his coded identification crest, but he had no choice. There was no bypassing the security system.

The secondary doors slid apart and he entered the vaults. More guards were posted inside, armed with paralysis pistols. No deadly weapons were allowed in this sector of the vaults.

Arranged around the sides of the first vault were thirty crystal cases, each with its own cryogenic device. And in each case, deathly still, was the figure of Alphonso Robespierre Nanda. Bio-chem bodies, near-human, but lacking mind or soul, preserved for future use. Like chickens in a freezer, Juan-Pablo thought. He hated this place, with its look of the crypt. But he knew that it served not death, but life, eternal life for The President.

At one of the cases a man, lieutenant by rank, was checking the temperature regulators. At least one of the bio-chem bodies had to be in a state of readiness at all times. The memories of President Nanda had already been fed into this one, and even now the living President's thoughts and ideas were being transmitted to the waiting body's brain. It would be activated instantly, should the living President be killed. Such a "spare" had been aboard the airship . . . and now it was The President.

The lieutenant turned and put down his charts. He snapped a perfunctory salute and smiled.

"So, on time as usual, Captain. I wondered if you'd come today. I thought perhaps you'd be preparing for the party tonight."

Juan-Pablo looked at the charts, then at the regulators. "I think you know me better than that, Tomás. Perhaps you'd care to go in my place."

"I wish that I could."

"Careful, Tomás, or you may get your wish. I find myself bored by these functions and their exalted dignitaries. I wonder what you see in them."

"Even diplomats have daughters," Tomás replied, "and the fair ones who grace such festive occasions are worthy of my interest."

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Juan-Pablo made a correction on one of the regulators. "I find most are as dull-witted as their fathers."

Tomás smiled. "My friend, who speaks of minds on a clear summer night?"

Captain Marcos smiled briefly, then walked to the other side of the vault to check the remaining cases. The lieutenant followed.

"Captain . . ." he said, then in a lower voice added, "Juan-Pablo . . . there is something we must discuss."

"What is it, Tomás?"

"My informers—in the city and elsewhere—several have heard rumors of another assassination attempt being planned."

"Again? Why do they bother! Are the rebels complete idiots?"

"This time, my Captain, it may be different. The rumors are that the rebels have found a way to kill The President . . . permanently."

"Impossible—the vaults are impregnable, even to nuclear attack. And the rebels have no such grandiose weapons."

"Still, the rumors persist."

"There have been rumors before."

"This is true, Juan-Pablo, this is true. Still . . ."

He paused. "Tell me, if—just if, mind you—The President was no more and the rebels seized power . . . what would become of us?"

Juan-Pablo breathed heavily. "Why think of such things?"

"One in our position *must* think of such things. A man who does not plan for emergencies is at the mercy of events," Tomás said guardedly.

"As are all men, in the final outcome," Juan-Pablo snorted. "And what plans have *you* made, Tomás?"

The lieutenant straightened. "None . . . yet. But it would be wise for us both to consider all possibilities."

"Do not worry too much, Lieutenant. And do not plan so far ahead that you lose sight of where you are now."

"Of course not." He stiffened, almost at attention.

"I will leave you to your work now. I have asked to speak with The President, and he will see me within the hour."

"Good day, Captain."

"Good day . . ."

The President's official chambers were located near the very peak of the Capitol Building. From its high vantage point one could readily see the startling contrast between the modern city and the land beyond, unchanged for centuries.

In the anteroom reposed a dog, a dark and powerful Doberman named Bruno. There had always been a Bruno, from a long line of dogs bred for fierceness and loyalty.

Nanda rose from his desk and came forward to meet Juan-Pablo as he entered the room. His appearance was that of a forceful man, youthful but prematurely gray. The features were finely chiseled, perhaps too finely, but few people still lived that could remember how Nanda looked

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before the succession of bio-chem bodies.

"Pablo," he addressed him, as was his habit. "Something important? They will expect us at the celebration by seven, and there is much to do."

"That is why I asked to see you. If it is possible . . . I would prefer not to go this evening."

"Why? What could trouble you so about my glorious celebration?"

"A variety of things, Excellency, but one most in my mind is the fact that . . . I failed to stop this latest assassination."

"What of it, Pablo? We caught the rebels, at least. And we reaffirmed in the minds of the good citizens of Santa Leona the very real fact of my immortality. We have won them for another ten years."

Juan-Pablo averted his eyes from The President. "But that also is part of what distresses me—of what use is the head of secret service . . . to a man who cannot be killed? I am viewed as a decoration."

Nanda cast him a reprimanding look. "Pablo, your father and his father before him were my protectors. Neither of them ever questioned their usefulness to me. Don't question yours. You have more value than you realize."

"Perhaps I merely do not have the resolve of my ancestors. I know I do not have their understanding. They at least worked with you to build the Federation—"

"Just as you work to maintain it. Do not regret being born after the revolution. The Federation is a constant challenge. Because we have created a perfect system does not mean we can rest."

"A perfect system . . ." Juan-Pablo echoed. "Why do the rebels continue to fight? What could they hope to gain? It is incredible that they could have a foothold at all with the people. And yet the incidents have doubled in the last few years."

The President paused reflectively. "I have outlived my old enemies. They are dead many decades now. But greed, corruption, lust for power—these are immortal, too."

Juan-Pablo glanced at the wall map of the world. "It is strange to follow the change in the nations that were our allies. Many now side with the rebels, and say they fight for freedom. Some even call you . . . dictator."

"Every man in power is a dictator to those who oppose him. Do not take their denunciations too seriously. Our one-time friends are envious of our success. And who can blame them for being jealous of a nation without war, unemployment or hunger. And, except for the rebel's activities, without crime. But the world's opinion matters not. Our people know of the glories of our system."

"Our people . . ." Juan-Pablo intoned solemnly, "they are our strength."

"Yes, and remember that. As long

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as they look to the future, the Federation shall prosper."

"How I envy their fervor. Sometimes I wish I had shared the common training program the people undergo."

Nanda returned to his desk, but remained standing. "It was not necessary for your job."

"No . . . not for my job."

"Your work is both limiting and demanding, Pablo. Just as I am protector of the Federation, so you are my protector, and thus protector of our system."

He straightened. "A duty and honor of the Marcos heritage, which I perform with devotion, Excellency." He paused. "But still there are so many things I do not know. So much I wish to learn."

"What can you lack? You have firsthand knowledge of the inmost workings of the Federation. You have traveled with our diplomats. You know the lands of our nation better than many know their own cities."

"But I would like to know the future of our land. The manner of realizing its potential. The hows and the whys of our cause . . ."

"The Federation is the how and the why."

"The people—what of the people? The merchants and workmen, the lowly ones of the field, they toil year after year, sacrificing what few luxuries they might have, to build and maintain the Federation. They *exist* to serve the Federation. But what I cannot understand, what I cannot begin to comprehend is this: For what purpose does the *Federation* exist?"

The President smiled faintly, calmly, then gazed out the great plastic window that was the north wall. Still looking out at the horizon, he spoke softly:

"Pablo . . . have you ever seen a beast of burden in the fields, one which has borne the yoke and strained against the drag of the plow or the cart? Have you ever seen this same creature set out to pasture? It becomes lazy and fat, with no interest in anything except avoiding the heat of the midday sun. It has no purpose, and is useless to itself and others."

He turned away from the window. "*Man* is a beast of burden, Pablo. Without a struggle to fight, a yoke to bear, he sickens and sours into a perverse distortion of himself. With too few problems and too much time, he questions why he lives and what point there is to existence. And if he does not have the answers, Pablo, he dies . . ."

"The Federation gives our people a cause, a reason for being, an answer—*the* answer for existence."

Juan-Pablo reflected on The President's words. "But are there not other reasons for living, better reasons?"

Nanda walked to his side, placed a hand on his shoulder. "You are young yet, and have not seen the

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span of humanity that I have. In time you will learn." His tone became one of concern. "Pablo, you are tired. I have seen you building up pressures within from working here, and the personal appearances, I know they tire your spirit. You must get away from here for awhile. Go to the countryside for a week or two. Tomás can handle things until you return."

"I don't know . . ."

"You must . . . it is my wish."

"Perhaps for a week . . . I could visit the valley where I spent my early years."

"Yes, that would be perfect for you." The President walked him to the door. "Remember, Pablo—even a beast of burden must rest occasionally."

The sleek new train, pride of the Federation, had carried Juan-Pablo far from the Capital and into the rolling foothills between the farming district and the mountainous jungle beyond. A rented jeep, ancient but still working, carried him further still until at last he reached the narrow valley where the first ten years of his life had passed.

The sun bore down with an unreal energy. It was not the alien sun that so coldly illuminated the Capital and burned the pavement of the streets. No, it could not be the same one, he thought. This one was wild and free, and at home here in this setting of verdant foliage and windswept fields.

Juan-Pablo was also at home here. And he was free of the Capital and its troubles. He could feel the pressures easing their grip and the memories of past days flooding his mind. Already his outlook was improving. How right had been The President's suggestion that he get away from his work and rest!

He left the jeep and walked down the gentle slope. Nothing seemed to have changed in the years since he had left the valley to begin the training necessary for his role in the secret service. It had been long years in the army academy where his body had been toughened and his skills in the martial arts developed. It had been more years in training at the Capital, where the bold and forceful ways of the military were tempered by the delicate maneuverings of diplomacy and governmental activities. And it had been more years still as second in command of the secret service, until the day when he inherited the top position. That was three years past, now.

It had been many years since his leaving. Eons, it seemed. Yet the river still ran where it always had, cool and quiet, inviting, calling out in low murmurings to the children who used to play on its banks.

It called out now to Pablo, and on an impulse he shed his shirt and boots and dove headfirst into the waters that for all time had poured down from the mountains and run their slow course to the sea. For awhile, he was a child again, happily

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reliving the days of discovery and carefree abandon. He let the water buoy him up and wash over him, cleansing his spirit and refreshing him.

When at last he tired of the river, Juan-Pablo walked up the grassy slope and found a comfortable spot. He stretched out, to think quietly about the past, and to let the blazing sun burn out the river's moisture.

He remembered the family he had so seldom seen, and his father, whom he had known only in the course of his training as supreme protector of The President, and the airship crash that had hastened his own promotion to Captain. He remembered the tutor that had taught him matters of intellect and refinement so that he could discuss any issue with Nanda. For there were few people in the Federation with an education in anything but the practical aspects of production, and there had to be someone he could talk to who would understand and not merely agree.

The tutor had taught him other things as well, strange ideas of "worth" and "value," of the beauty of nature and the dignity of man. These were things he never heard the lowly workers discuss, nor even the diplomats, who normally had a love for great and lofty words. So he kept these ideas secret.

And the house. He remembered it as well.

Juan-Pablo rose from the ground, pulled on his boots and plucked his shirt from the branch of the bush where he had left it. The house was only a short hike upstream, around the bend in the river.

Walking easily along the bank, he approached the spot where the old house had been built, so very long ago. An opening in the trees gave him his first glimpse of the tiled roof.

Closer now, he could see something else as well. A small group of people busied themselves at various activities near the house. They were dressed in the simple peasant garb of the common workers.

A flash of recognition seized him as he saw one of them –a young woman, setting up surveying equipment. Her face and form were different now, but her movements and mannerisms had not changed since early childhood, when she had played with the other children in the fields. Except for Juan-Pablo, those who lived in the valley were farm people, workers of the earth, and the days of carefree childhood were shortlived.

She saw him approach, stopped her work, and waited for him to reach the spot where she stood. Juan-Pablo wondered if she would remember.

"Captain Marcos," she addressed him. She smiled, but it was a smile of courtesy rather than friendship. "How long has it been?"

"Too long, Margarita. I did not realize until today how much I have missed the valley." He looked at the

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construction work taking place a quarter-mile down the river. "How did you know of my promotion?"

"In the Capital marketplace where we take our produce, it is possible to hear many things. Last year, Father even saw you in San Cristobal, although I don't think you saw him."

"Ah, the rally in San Cristobal." Juan-Pablo sighed. "I thought I saw at least one familiar face there. But I see so many faces."

"You have changed much since I saw you last."

"As have you, Margarita. But tell me, what is your work here?"

"A great new project for the Federation." She swept her hand towards the river and the distant construction work. "Soon there will be a dam and a mighty hydroelectric generator plant. There will be enough power for everyone in the valley."

"At least!" So, he thought, now they will even hold the river captive, enslave the waters and put them to work for the Federation. "I wonder, do even rivers need a cause?"

"What?"

"Nothing," he added quickly. "Only a poor joke." He looked at the instruments she held. "Don't tell me you are an engineer now?"

"An apprentice," she replied. "We are all working on the project in one way or another, until the army arrives to finish the work and operate the plant. By then it will be time for us to harvest our crops."

"And your family?"

"They are all well. Our farm is leading the others in production," she said proudly. "and my brother is now district supervisor."

"I am glad you are happy," he replied. "Now that I know you visit the Capital, perhaps I will see you there. I have some time off occasionally, and, of course, there are many things besides the marketplace to see. Perhaps . . ."

She looked away from him, and resumed setting up the survey equipment. "I don't think so, Juan. Next week I am to marry Miguel Lobero."

"Lobero–*that fool*? You always hated him when we were children."

"People change . . ."

"Not that much, surely!"

She faced him with eyes flashing. "Miguel has a farm of his own now, and will have to have a family. You know the need our country has for more people in farming. I *must* marry him–it will serve the Federation!"

"And what about you, Margarita? What about you!"

"What do you mean?"

"Don't *you* deserve the right to pick the things you want in life? There will be things beyond your reach, of course, but at least you must have the right to choose! Don't you care about your own happiness?"

"I am a loyal citizen of the Federation. I am not capable of knowing what is best for me. You know the Federation is right and just–"

"Not when it denies you such a

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basic thing as happiness or the choice of a husband."

She stared at him in disbelief. "You sound more like . . . more like a *rebel*, than an official of the Federation!"

Juan-Pablo stiffened. "Watch your tongue! Remember that I am Captain of The President's secret service."

"I do remember, Juan" she said coolly, "but *do you*?"

He backed off several steps, about to leave, then turned to face her, his voice low. "Perhaps you are right after all. People do change . . . sometimes very much."

He left, wondering what the real reason was behind the massive hydroelectric plant under construction. And wondering who or what had destroyed a child, and turned her into a mindless robot.

The walk back to the jeep seemed to take longer than it should. The sun that before was wild and free, now was only hot and glaring.

Juan-Pablo climbed into the battered vehicle and started the engine. He was not yet sure where he wanted to go. There was one public inn at the town where he had rented the jeep, or there was the exclusive seaside resort on the coast, reserved for important officials. Neither one appealed to him at the moment.

Then a flash of light caught his eye. A momentary bit of brightness that seemed centered in the rearview mirror. He looked for its source in the mirror, without turning. It came again, and this time he saw it clearly—the minute twin flash of a pair of binoculars, up on the hill behind him.

So, he was being watched. But by whom? Juan-Pablo wondered if the rebels did indeed have a new plan of assassination, and if it included him as well. If so, here was an ideal opportunity to eliminate the captain of The President's secret service.

No attack came. If they were watching, and only watching, then why? Then a disturbing thought came to him. What if it were not the rebels who had him under surveillance, but Federation agents, or his own people?

Captain Marcos shot the jeep forward, down the road to the city. He knew now where he had to go. Whatever the nature of the mystery that confronted him, the answers could only be found in one place.

In the Central Scanning Room early the next morning, Lieutenant Tomás Fierro studied the viewscreen of sector 349 for signs of unusual activity. There were none. For many years now, the statues honoring Nanda in each town and village served not only as constant reminders of The President's greatness, but also as remote transmitting points, sending images and sounds back to the Capital. The watchers had made things more difficult for the rebels. More difficult, but not impossible.

Juan-Pablo placed his hand on Tomás' shoulder. "Previewing the

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site for tomorrow's visit, Lieutenant?"

He jerked slightly, in surprise. "Captain Marcos! That was a short vacation, wasn't it?"

"Quite long enough, Tomás. Those few days now seem like a week."

The lieutenant laughed. "Perhaps you found the peace and tranquility of the country too much to endure."

"Yes . . . in a way. What I found there was—disturbing."

"Well, then—welcome back to the active life of the city." He switched off the viewscreen. "You'll be going with The President tomorrow?"

"Yes, I may as well resume my duties . . . unless you'd prefer to keep your new position a while longer?"

"I think I have held it too long already," Tomás replied. "I have discovered there is a very great difference between knowing what a job is and having to do it!"

"Well enough, then." Juan-Pablo took up the clipboard from its place on the console and checked the travel itinerary. "How was the party, by the way?"

Tomás cast him a downcast glance. "It was very much as you said it would be."

"You can't say I didn't warn you."

"Humph!"

Juan-Pablo flipped past the third page on the clipboard. It was a routine personal appearance tour including several villages and a medium-sized town—the same as the last thousand such tours. Only the minor details mattered, and even these were monotonously similar.

Other thoughts crept in. He wanted to ask Tomás if his or another department had been ordered to place him under surveillance. And if so, why? But—he also knew it would be pointless to ask. If they had, they certainly wouldn't tell him. And if they had not . . .? Juan-Pablo was beginning to feel uncomfortably isolated—a man very much in the middle of dangerous forces.

"Tomás," he said, trying to keep his tone conversational, "I noticed they are building a hydroelectric plant in the valley. Quite a project, it seems. Have you heard anything about it?"

"No, not really." He scratched his chin, looking off into space. "I imagine it is just part of the overall improvement program. You know, electricity in every home, a chicken in every pot?"

"Seriously though, doesn't it seem strange to build a Class One power plant to serve such a tiny valley? There's nothing else but open farmland around for miles."

"True, there's nothing there now . . . but perhaps there will be, once such a power plant is available. You know how well in advance the Federation makes its plans."

"Yes . . . only too well."

There was a brief moment of silence.

"Why do you ask, Juan-Pablo?" Tomás questioned, a look that was a bit more than idle curiosity in his

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eyes as he waited for an answer.

"I don't know," he sighed. "I guess it is always strange to return to the place of your birth and find things have changed." He smiled, convincingly, he hoped. "But I'm sure you don't want to hear me reminisce about old times. Have you had breakfast yet?"

"No," he replied, his face relaxing into a comfortable smile. "Not yet."

"Well then, let's go. There is a long day ahead of us . . ."

The records center of the security files office was empty when Captain Marcos approached it, some two hours later. The first time he had passed by its doors, two men from his own department and one from the Capital police squad were busily filing their daily reports. But now they were gone, and the solitude left behind offered at least momentary safety for Juan-Pablo's plans.

He activated the recall circuits of the computer filing system, which would respond to preliminary instructions. It was then necessary to allow the scanner to read the microscopic patterns of his identification crest. Otherwise, he would not have access to the classified material stored in the system.

The clearance light flashed on.

His first query brought an answer in the form of a glowing image on the visual display screen. Basic engineering plans for the new hydroelectric plant clicked off systematically in cool electronic pictures. The plans verified what Juan-Pablo had suspected while at the construction site. In fact, they seemed to indicate a more powerful generator facility than he had imagined.

But that was only part of it. What of its purpose? He brought a map reproduction to the screen, then directed the computer to superimpose upon it the pattern of power output. Thin red lines traced out a network encompassing the isolated farming communes in the valley, the lines emanating from a brighter crescent appearing midway along the river. The network shown would use no more than one-hundredth of the power available.

Are there any other planned power connections? He typed out the question on the console keyboard. Seconds later, another glowing red line appeared on the screen. A solitary line, but thicker than the delicate traceries of the commune link-up. This line went completely off the viewscreen.

Juan-Pablo fed new map coordinates into the computer input. To find out where this new power line led, he would have to shift the image laterally on the screen. The map image crept slowly to the left, drifting farther away from the farming district and closer to the mountainous region beyond. It stopped upon reaching the specified coordinates.

The red line showed an irregular pattern in the hill country that suggested underground implacement of the power cables. After winding its

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way several miles farther into the mountains, the line terminated in a rough region inaccessible to land vehicles.

There was a glowing dot of light at the end of the line, but no symbol to indicate what it was. Again, he worked the keyboard: *What is the purpose of this installation?*

On the screen, the computer responded with the word: DEFENSE.

Defense? Defense from whom, Juan-Pablo thought. The neighboring nations of the hemisphere were not on friendly terms, to be sure. But despite the picture painted by Federation diplomats, they were not invaders either. And besides, wasn't the place for defense installations along a nation's borders, and not hidden away in the mountains?

One more question might tell him what he wished to know: *What is the nature of its operation*?

Several more seconds elapsed, then something happened which surprised Captain Marcos. The display screen went blank and the clearance light winked off. He tried more questions, and attempted to reopen the circuits, but all efforts were blocked. The console switched off automatically, denying him further use of the files.

The action was unexpected. As captain of the secret service he had always had complete access to all classified material. At least, he thought he had . . .

Captain Marcos wandered down endless corridors of the Capitol Building, new doubts following him like the echoes of his footsteps. He was hardly aware of the direction he was taking.

A dog's sharp yelp brought him out of his thoughts. He stopped abruptly, looking for the source of the sound, yet knowing it must be Bruno. There were no other dogs in the Capitol Building proper.

From the doorway ahead, a dark blur came skidding out and hurtled towards him. There was barely time to act, but with a quick lunge, he grabbed Bruno's large studded collar and halted the fleeing Doberman. Only his familiarity with the dog prevented quick retaliation from the beast's flashing teeth.

Bruno calmed down, but it was only with considerable effort that Juan-Pablo brought him back to the room from which he had made such a hasty exit. They were greeted at the door by a small man with graying hair and gentle eyes.

"Dr. Ortez, isn't it?"

"Yes, Captain," the man replied. "Thank you for bringing Bruno back."

"He seemed to be in quite a hurry."

"Indeed he was," Ortez chuckled softly. "I'm afraid that for all his bravery, Bruno is not very fierce when it comes to getting his shots."

Juan-Pablo sat on the edge of a low cabinet and scratched the dog's ears. "Is he in poor health?"

"No, quite good, really." Dr. Ortez

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picked up the empty hypo-cartridge from the floor and tossed it into the trash. "I just brought him down here for his periodic checkup, which among other things, seems to be one of my chief duties."

"Veterinary work is a somewhat unusual task for a high-court physician."

"High-court physician, am I? I suppose I am . . . whatever value there may be in that. Our good President needs me only for minor repairs between replacements. And our diplomats—they do not stay around here long enough to require my attentions." The doctor began washing his hands. "No," he snorted. "Here I only administer to dogs and wayward soldiers—a fine practice for a once proud physician!"

"The Federation," Juan-Pablo suggested, "does not encourage pride on a personal basis: only devotion to duty."

Ortez eyed him cautiously. "Do not think that I speak against it—I am only an old man, a practitioner of the medical arts, who is bemoaning his fate of being human. Years ago, I had dreamt of a glorious future, as do all good medical students." He dried his hands with a disposable towel. "But the realities of age destroy the dreams of youth."

He paused.

"But forgive me for getting off the track. Aesthetics do not fit well in the sterile confines of a dispensary."

"Is old Gamez still training the dogs?"

"Yes, but he is breaking his son into the business. It is too hard a job for a man of his age to keep up with now."

Juan-Pablo cradled the dog's head in his hands, looking into dark soulful eyes as deep as canyons in the night. "Poor Bruno," he said. "You are each different . . . but to Nanda you are all the same dog."

"If our President shared the same problem," Ortez began, "then Gamez' and my work would be much easier."

"What do you mean?"

"Nanda's miraculous reincarnations may not disturb *us* greatly—we humans recognize a man by the way he looks and sounds. But Bruno pays little attention to such insignificant details. A dog's philosophy rests in his nose, and unfortunately no two bio-chem bodies have precisely the same scent."

"That must be confusing!"

"We've managed to overcome the problem in most cases with reconditioning and special training; and sometimes by chemically distorting the dog's olfactory sense."

"You said in most cases . . . but not all?"

Ortez thrust his hands into the pockets of his long white coat. "No, not all cases. Some dogs have had to be replaced. And once . . . once there was one who got it into his head that the newly incarnated President was not the same man at all—and tried to bite him. It had to be destroyed, of course."

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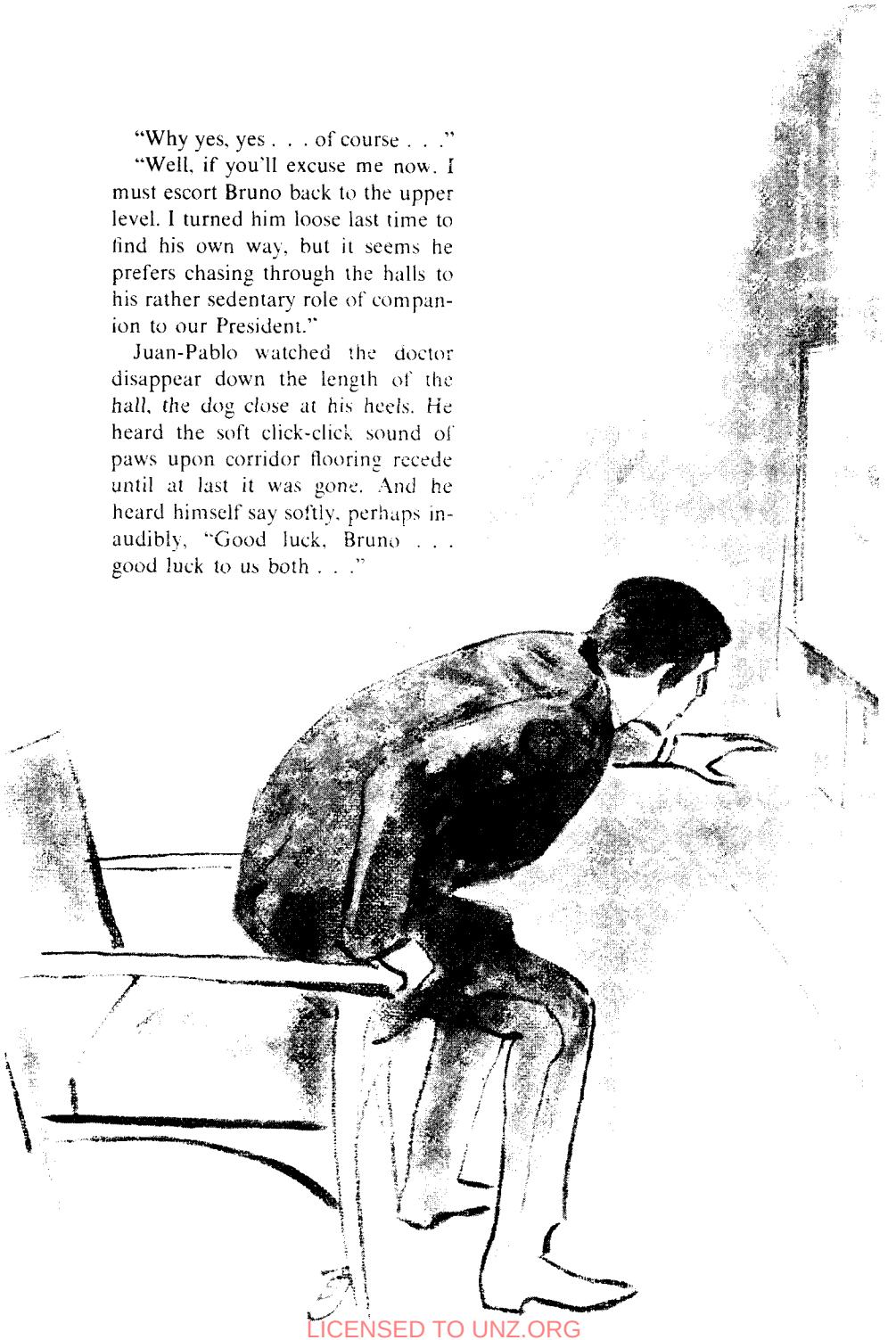
"Why yes, yes . . . of course . . ."

"Well, if you'll excuse me now. I must escort Bruno back to the upper level. I turned him loose last time to find his own way, but it seems he prefers chasing through the halls to his rather sedentary role of companion to our President."

Juan-Pablo watched the doctor disappear down the length of the hall, the dog close at his heels. He heard the soft click-click sound of paws upon corridor flooring recede until at last it was gone. And he heard himself say softly, perhaps inaudibly, "Good luck, Bruno . . . good luck to us both . . ."



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In the privacy of his quarters, new fears began to haunt Captain Marcos. More disturbing than the fact that information had been kept from him was the realization that something, some plan or project, was afoot in the country which required absolute secrecy, so much so that not even top-ranking officers of the Federation were allowed to know. And yet some must know, for how else could the plans be implemented?

There were other doubts as well, doubts that tarnished the once glorious image of the Federation. He was not sure where or when it had started, perhaps years, maybe only weeks ago. But he felt he was beginning to drift. And the direction of that drift made him fearful.

A sound broke his concentration. The viewscreen that displayed the daily news telecasts also served as intercom. Now activated from another location, an image was forming.

President Nanda appeared, his face etched with concern, or what passed for concern. For beneath this mask, Juan-Pablo could see the face of merciless omnipotence.

"Pablo," Nanda's voice droned, "the automatic file monitors report to me that you have been seeking answers to things that do not concern you. This, and your words and actions of late, make me wonder if you are being misled by negative sources."

Marcos said nothing. His eyes drifted to the travel case of civilian clothes not yet unpacked from his hastily terminated vacation.

The President continued. "It hurts me to think that you are the victim of wrong-thinking. Especially you, who has been given so much, and who is so close. It's not too late to make amends, Pablo. Confess your mistakes and doubts, and you will be forgiven. You know the Federation is fair to its people. Punishment is only for those who will not renounce their negative views, for those who will not declare their loyalty . . .

"Confess, Pablo. Assure me of your strength and breeding. Remember always that you are a Marcos. Confess . . ."

No answer came. Nor could there be one.

The private quarters were empty. The door was left hanging open and Juan-Pablo had disappeared into the corridor. Within a matter of moments, guards were combing the halls of the Capitol Building. Every inch of the miles of corridors was searched. But Juan-Pablo Marcos was nowhere to be seen.

No one knew of the narrow pas-

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sages which honeycombed the Capitol Building. No one except Juan-Pablo, that is. It was a private secret, entrusted to him by his father. He had never understood the reason for the secret, not until now. And he began to wonder if even his father once had felt doubts.

Juan-Pablo set down the travel case he had grabbed on impulse as he fled his room. In the dim light of the passageway he swiftly changed into plain, nondescript garments and shoes. Abandoning his shiny boots and neat uniform, he continued on his way.

The passageways ensured his escape from the Capitol Building, but where could he go from there? He would be a hunted man, hunted even by the millions of quiet citizens who knew only the orders they received, and to obey them. He could only hope the guards would try to catch him secretly before alerting the populace.

Transportation to other nations was nonexistent. Who could afford to travel except diplomats? There was no way out. He could not leave the country even if he wanted to. And he did not want to.

A plan began to form in his mind . . .

Night had fallen on the city. Juan-Pablo had spent most of the afternoon roaming the streets and alleyways, being careful not to pass too near the guard stations which dotted every third block. Part of the time he had spent in nearly every public tavern and meeting place he could safely visit. By now, he reasoned, word of his "falling out of favor" must have reached many in the city. Certainly it would have reached the ears of those he was looking for, and if he could avoid being turned in by a loyal citizen of the Federation, then—

A police vehicle turned around the corner ahead, coming in his direction. His heart pounding, he ducked into a doorway beside him. Deep shadows enveloped one corner, where no glow from the street lamps reached. There in the darkness, he watched the car glide past, apparently on its regular patrol. But there could be little doubt that their duties now included the search for Juan-Pablo Marcos.

He noticed that the doorway led into an old bookshop. The streets were almost deserted now, making it easier to be spotted by police patrols. He would have to spend more time in stores and taverns, and less in traveling. Opening the door, he went inside.

A small table near the front of the store overflowed with government pamphlets on every topic imaginable. Illiteracy no longer existed in the Federation, thanks to The President. Indeed, how could it? Not when there was so much to read about his wonderful accomplishments. Not when there was so much to learn; so much to believe.

Juan-Pablo browsed among the

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selections displayed on tables and racks. His lips gave the faintest twitch of an ironic smile at sight of the one pile so carefully ordered. Neat little rows of the familiar white book; gold-embossed letters spelled out "The Wisdom of President Nanda." Was there a single citizen in all the Federation who did not have a copy? Surely not, he thought.

Slowly, he became aware of the shopkeeper's gaze. He must have been studying him for several minutes now. But did he recognize the captain of Nanda's so-called secret service? Juan-Pablo decided it might be best to move on, and take his chances in the street.

"Señor—" the shopkeeper called to him. "You like books, do you? I think I have a volume which might interest you."

Marcos froze where he stood between the front table and the door. A seller of government periodicals would be a good and loyal citizen, would he not? And very ready to turn in a renegade captain; perhaps ready to spring a trap of a deceptively simple nature.

And then again, such a bookshop would make an excellent front for a rebel sympathizer. Should he take the risk?

"What type of book?" he asked.

The man moved away from the counter. "A very special one, my friend, of great historical significance." He pointed to the rear of the store, where racks of books left tiny darkened alleyways between them. "It's over there, third rack from the left. I'll show you."

They walked back to the alcove where darkly covered books seemed to mingle with the shadows. From the titles, Juan-Pablo could tell the books were the usual sociodramas, novels intended to instruct rather than entertain. There was, of course, no "book of historical significance."

"What do you want?" Marcos asked, turning to look into the answerless grin of the shopkeeper. He ducked instinctively, but too late to avoid the swarm of men who grabbed him from behind, jerked him through the parted curtain of the rear wall and into the store's back room. His first impulse was to fight back, but the weapon now pressed to his head was a convincing argument against further struggle.

In the darkness, Juan-Pablo could not see who it was that bound his hands behind his back, gagged him, and supplemented the darkness with a tight-fitting blindfold. But he did not have to wonder long. The answer came with the hurried whisper of one of the men—

"Quickly, out the back—the Fed-Pols that were following him will not wait long before their suspicions bring them into the store!"

So, he was in the hands of the rebels!

And he had been followed, for who knows *how* long, by the Federation Police. That was something that had escaped Captain Marcos' usu-

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ally sharp eyes. The fact hurt his professional pride only long enough for him to realize how little it mattered now.

He was hastily bundled out of the store and into the alleyway. Tripping and stumbling, he was guided swiftly along a series of back alleys and deserted arcades. The pace was too dizzying, too hectic, for him to perceive direction or distance.

After many long minutes they came to an abrupt stop. The sound of a creaking board broke the stillness and Captain Marcos found himself shoved through what seemed to be a narrow opening in the side of a building.

The pace slowed now, and more minutes passed in a brisk walk down long empty corridors which echoed the mixed sounds of their footsteps and heavy breathing.

"Watch it now—steps," one of them cautioned him. They guided him down a flight of stairs.

Juan-Pablo marveled at their concern, and at the fact that they did not instead throw him down the stairs. But perhaps their goal was not to harm him. At least, not yet.

A door opened in front of him and he was ushered into a room where a faint amount of light seemed to penetrate his blindfold. Hands thrust him forcefully down onto a chair, then the door slammed shut, footsteps receding in the hall.

Was he alone?

He was just debating with himself whether he could detect the sound of breathing when the blindfold and gag were suddenly whipped away and light battered his eyes. After they became used to light again, he could see the source of it was a portable electric lantern, sitting on a wooden table before him.

Two people faced him: one, a girl in her mid-twenties, the other a man, a few years older. Neither was familiar to him.

The girl spoke first. "You are quite a catch for us, Captain Marcos."

"A great capture," he snorted. "But a feat which took me the better part of a day to accomplish! I was beginning to think there were no rebels left in the Capital."

"I can assure you, there are many," she replied. "We knew you were trying to make contact today. I'm sure you can understand our caution. You and your people have made things very difficult for us in the past."

"I could say the same for you."

The man now began to pace, like a wary animal. "I still don't like this," he said. "I find it hard to accept such an open meeting with one of the enemy."

Juan-Pablo stared through him. "It is no easier for me to find myself here among rebels. But ironically enough, you are the only ones that I can trust not to turn me over to my own people."

The man faced the girl. "This could easily be a trick—a Federation plot to uncover our underground."

"I don't think so," she replied.

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"That is not the kind of game Nanda plays, not with so valuable a playing piece."

"Understand this," Juan-Pablo advised them, "I am here for reasons of my own, which may or may not include approval of your ideas and methods."

"Nevertheless, you *are* here," the girl replied, "in body at least, if not yet in spirit. And your immediate future depends greatly on how convincing are your reasons for coming."

Captain Marcos relaxed somewhat in his chair. "The first reason is simple. I have come under suspicion. My faith in the Federation was doubted. I asked questions which no loyal citizen would ever ask, and so now I am considered a renegade. What place is there to hide, except among other renegades? But there are other reasons, more important ones."

"Which are . . . ?"

"It occurs to me you may have access to information which even I do not."

"Possibly. We have influence over many people, some in places you would not believe."

"Like Tomás?"

The man stiffened, a startled look on his face. "You knew?"

"I guessed," Juan-Pablo stated. "His actions lately have been somewhat unusual. But what I want to know is if you have found out anything about a certain new power plant in the farming district. My inquiries about its purpose brought vague answers, and a threat of punishment."

A thin smile curled the corners of the girl's mouth. "How tragic, that a trusted and highly placed member of the Federation should not even know of his President's plans for war."

"War!" Captain Marcos leaned forward in his chair as much as his bonds would permit. "There is no prospect of war in this hemisphere. And the project served by the new power plant is labeled as a *defense* installation."

The girl stepped forward. "There may be no prospect of war in the minds of our neighbor nations, nor in the minds of those who do not know. But that does not stop Nanda from making plans—even tonight he is busy. And that so-called defense installation? Those few of our men who survived long enough to get a message out to us told of a laboratory complex being built, and missiles that will reach to the heart of other countries."

"Nuclear missiles?"

"No . . . but something which is perhaps even worse. There are rumors of a disease being bred—a virus that will infect millions, and reduce them to unthinking automatons. An easy victory for our armies."

"But why? The Federation is now stable and secure."

"That is precisely why!" the man stated. "The people need a new dis-

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traction. As long as there is not some future plum dangling before their noses, they pay too much attention to their present miseries. Control the promise of a man's future, and you control the man as well."

The girl said, "So now you have the answer you sought, although I see you don't like it. Where do you stand now?"

Juan-Pablo paused. "I still do not know who my captors are."

The man ceased pacing. He paused near the room's second door. "I think you would know us best by our code names. The police have those, though they hunt for faceless men. I am Eduardo."

"And I," the girl added, "am called Esper."

Recognition showed on Marcos' face. "So, you are highly placed members."

"Not just members," she replied. "We are the leaders, since the ill-timed demise of our predecessors last year. The position seems to be shortlived. But then, a rebel's occupation is not encouraged. If it were not for a few families who risk the danger of betrayal by teaching their children the old ideals, there could be no rebels at all. But the ideals *have* been kept, and handed down from generation to generation. Enough to counter in some part the effects of the mass training programs."

"If my would-be allies would consent to untying me, there are things we should discuss," Marcos said.

"I say no!" Eduardo snapped. "And don't call us allies yet. We may work together and we may not. How do we know you won't turn us in, to buy back your place of trust?"

"You don't. And I can't be any more sure that your people will let me leave here alive. But if we're going to achieve anything at all, we're going to have to trust each other."

The girl's face held a troubled smile. "An odd kind of trust," she said, "that is based on mutual fear."

"Let's be glad for the moment that we can at least hold something in common, even if it must be fear."

They seemed to consider it.

"Untie him," the girl said.

Eduardo moved to obey.

As Marcos rubbed circulation back into his hands they studied him. "I think we may have more in common than you are willing to admit, even to yourself," she said.

"Perhaps so. Your ideals, I suppose, are mine as well. But I think we differ on the matter of The President."

"He is a tyrant!" she exclaimed. "He must be destroyed."

"He may be a tyrant, in at least some meanings of the word—I'll grant that much. But he's not altogether wrong about what's holding the Federation together. The effect of the people's training programs can't be undone overnight. If you eliminate Nanda, tear down the structures he's built and proclaim the new leadership of a rebel govern-

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ment, the nation will collapse around you. At worst you would all be destroyed by angry mobs, and at best, the Federation would disintegrate into a thousand despotic kingdoms. You don't want *that*, do you?"

She hesitated. "No."

"And the only way you could prevent that from happening would be to impose such harsh and all-powerful military control over the people that you would make Nanda's system look like democracy. You would defeat your own purpose."

Eduardo turned. "There must be controls anyway. The people have been so brainwashed that they don't even know they are oppressed! They . . . they are like mindless children. They don't know what is good or bad for them."

Juan-Pablo stared at him long and hard, and when he spoke there was contempt in his voice. "How much your words sound like Nanda's! You don't realize, do you? Have you fought for so long that you forget what you are fighting for? In the name of freedom you would do what The President has already done in the name of progress and unity—control them, oppress them, because you think you know better than they what their rights and duties are. Tell me, liberator, what would your title be, King? Premier? Or would it be 'The President'?"

There was for a moment a flash of anger and hatred in Eduardo's eyes, bright as the glint of cold steel that gleamed near his hand. But the knife remained sheathed and the look faded.

Moving between them, the girl who called herself Esper interceded. "I think he is right, Eduardo," she said softly. "He knows what he is talking about. And if our goal is to end injustice and tyranny, then we must not do it by unjust measures, becoming tyrants ourselves."

Eduardo considered, seemingly fighting an inner battle of his own. At last, the look of turmoil on his face changed to one of resolve.

"All right, then," he said. "We will work together in the restructuring of the Federation. We will do it your way. But there will still be problems. Even if we are successful in deposing Nanda, there is a chance that the leaders of the army will revolt against us in turn."

"Don't worry about them," Captain Marcos said flatly. "They are leaders with one will—The President's. Nanda must have always feared the possibility of a military coup. His hand-picked generals are weak men, who only follow his orders. They will follow ours if need be."

"Then it is settled," the girl remarked.

"Not entirely." Juan-Pablo walked around to the other side of the table. "To maintain the security and strength our nation must have will be a challenge. To bring about the changes we wish without destroying

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everything is an even greater challenge. But the first problem that jeopardizes all our hopes is this: Your new plan of assassination must not be carried out by any of your people. Can you get word to everyone?"

Esper flashed a quick look of fear and apprehension at Eduardo, then looked back with reluctance into the stern gaze of Captain Marcos. "It may already be too late," she said.

"Why? What do you mean!"

"The plan for his destruction is already in progress."

"But *how?*"

"We learned of The President's meeting tonight at his mountain retreat. His diplomats and foreign agents are to tell him the information they have gathered, so that he can make plans for the forthcoming war, and the incidents that will be required to trigger it. One of our men has been working as a servant there for nine years. We have finally managed to smuggle a weapon in to him with the food shipments."

Juan-Pablo replied: "You realize that it will only result in a new replacement body being activated in the Capital–"

"Yes, of course," Esper said. "But our mutual friend, Tomás, has erased the memories stored in its brain. And even should the slightest spark of Nanda's mind be transferred to the body, it will be trapped there–it is defective, without the power of movement or speech."

"Sabotage is impossible! How could you be telling the truth? The laboratory where the bio-chem replacements are produced is too well guarded."

"From the outside, yes. But not from the scientists who work there. As I said before, we have influence in many circles."

"It must be prevented, or else all our other efforts are doomed to failure."

Eduardo slammed his fists against the table, then leaned forward on both hands, head down. "There's no way we can stop it! We have no means of communicating with our man there, now that it has started."

The girl grasped Juan-Pablo's arm. "Can't you send a message, warn the security guards? Our man's fate is sealed whether he succeeds or fails."

"It's not that simple," Captain Marcos insisted. "I doubt they'd believe me, even if the police would allow me to send a message. Besides, we must not only spare Nanda's life, we must capture him to destroy his power."

Silence fell over them. The atmosphere in the tiny room seemed ready to explode.

"There is a way," Juan-Pablo said, at last.

"Tell us, quickly–there may be less than an hour left!"

"If I can reach the Capitol Building, I may be able to undo what has been done, and even turn it to our advantage."

They moved towards the door.

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"We'll show you the way out," Eduardo replied.

Up the stairs and along darkened corridors they raced. Only twice did they have to stop at points where rebel guards stood watch. At the door to the alleyway, Captain Marcos faced them.

"Make sure your people are ready. If I succeed, I'll order our security men to let you pass. I'll get word to you somehow."

"And if you fail?" Eduardo asked.

"If I do . . . there is no place any of us can hide."

The girl opened the door panel and looked out. It was safe. No one was in the alley.

"Captain . . ." she whispered, "good luck."

Juan-Pablo paused briefly, about to say something, then changed his mind and disappeared into the darkness . . .

There was little movement along the avenues and in the great plazas that surrounded the Capitol Building. Captain Marcos kept to the shadows as he dashed down the streets and across landscaped squares and gardens. But only there could he solve the many-headed problem the rebels had created.

As Juan-Pablo approached the main highway he slowed his pace. There, not more than fifty meters ahead of him, a police vehicle was parked. He could not be certain if men had been posted to watch for him or not. It seemed unlikely they would expect his return to such a well-guarded area. The vehicle could merely have stopped on its normal rounds.

Whatever the case, he was committed. If he had already been seen walking towards the highway, a sudden withdrawal from the area would only arouse suspicion. He had to reach the Capitol Building, soon. There was no time left to waste in waiting for the patrol car to leave. The most direct route was dangerous, but it was also the quickest.

Juan-Pablo turned up his coat collar to partially shield his face. Darkness would aid him, if only they did not use their lights, or stop him for questioning.

He strolled casually across the intersecting avenue, like a man out for an evening walk. Fighting the anxiety that built within him, he tried to keep his breathing calm, his pace even.

Thoughts ran through his mind, a strange medley of hopes and doubts. Why were there not more guards out? Was Nanda so confident of his safeguards that he did not fear attack—or was the relative ease with which Marcos made his approach only the deceptive calm of a trap? If caught, Marcos could be sure of one thing: He would receive no flashy public trial whose outcome was known in advance, like so many "enemies of the Federation." A man in his position would simply disappear, to be quietly replaced.

Juan-Pablo glanced back care-

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fully. The police had made no move. It seemed he had not been recognized. Despite his fears of a trap, his hopes soared.

There was a continuous line of tall shrubs along the highway, and in the cover these provided he made swift yet unhurried progress towards the building. With each quiet footstep, with every cautious breath, he drew nearer his goal. There was more than adequate cover to make it the rest of the way. His heart pounded as he left the wide highway and started across the grassy expanse of ground.

The entrance to the secret passageway was just ahead, in the long outer wall that ran part way around the grounds and connected with the building. It should take just a few more minutes, but--but there was an added problem.

A guard on a walking post had unknowingly stopped near the hidden entrance. He was sipping hot coffee from a thermos, brought his weapon to ready position and walked towards the spot where the sound originated. When he was a good distance away from the wall, Juan-Pablo crept stealthily to the bend in the ancient stone embankment. There, in the niche behind a statue, was the secret entrance.

He opened the concealed door and entered the passageway. The door closed behind him, and within moments he was working his way through the honeycomb of secret corridors. Still ahead of him lay the task of reaching the underground chamber. An impossible task, it seemed, for to do so he must get past the guards in the first chamber of the vault, then somehow penetrate the airlock. The airlock with the security device, which by now had certainly been programmed not to admit him.

And there was no way to bypass the system . . .

Captain Marcos leaned forward, peering down at the suspended box of metal that hung below him. A branch of the passageway connected with the elevator shaft, one floor above ground level.

There had been no way of approaching the elevator from the hall without being seen by the guard stationed outside. And once spotted, the alarms would be sounded, making his efforts futile.

Grasping the cables in his hands, he slowly let himself down to the level of the elevator car. He tried to make as little noise as possible as he unfastened the emergency panel on top, then climbed down into the elevator.

The guard outside would hear the whine of the motors if he started the car. But that could be taken care of as well.

His finger pressed the center button on the control panel. Instantly, the elevator doors slid open. Before the startled guard could turn, a quick karate chop had rendered him unconscious.

Juan-Pablo pulled the man inside, then closed the doors. "Sorry, ami-

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go," he said softly. "I'll make my apologies later."

The car descended, down to the lowest level. There was just time for him to prepare the next step of his plan.

In the vault, two guards stood at their posts beside the elevator doors. They had heard the car's descent, and stood ready to receive its passenger.

They did not expect what was about to happen . . .

The doors slid open and the guards snapped to attention. But no one came out. They stared unbelievingly into the car. Slumped on the floor was the guard from the ground level.

Quickly, the guards entered the elevator and examined the unconscious man. Their mistake was in not looking up. From the top of the elevator, Captain Marcos dropped down upon the men. Caught by surprise, they were easily subdued.

Across the vault, beyond the clear plexiglass walls of the airlock, Lieutenant Tomás Fierro and two security men watched in astonishment. As Juan-Pablo looked across the gap that separated them, he wondered if he had calculated correctly.

A host of unspoken questions flashed across Tomás' face. Then, abruptly, he yelled to the security men in his half of the vault–

"Get him! *Quickly!*"

The guards dashed into the airlock, then paused for the scanner to operate. When the far door opened, they would have Captain Marcos at their mercy.

But the far door did not open.

Tomás leaped forward to the control console and slammed his fingers against the airlock control button. In an instant, the doors locked tight. Paralysis gas flooded the plexiglass chamber.

The guards inside struggled vainly, then slid slowly to the floor as the gas assaulted their nervous systems. They would be immobile for hours. Its job done, the gas was purged from the chamber automatically, restoring breathable air.

The two men on either side studied one another. An intercom connecting the two sides of the vault was switched on by the lieutenant.

"So," Tomás spoke. "You have joined the other side after all." He smiled. "Welcome to the rebels!"

"There is little time, Tomás!"

The lieutenant's expression became more serious. "Why are you here?"

"There has been an amendment to the plan," Juan-Pablo replied. "There are uses to which we may put our President, if he is kept alive."

Tomás weighed the matter. "How do I know I can believe you, my friend?"

Marcos was growing impatient. "I have just had a meeting with Esper and Eduardo . . ." He waited for the significance of the words to sink in. "Would they allow me to leave if they did not have faith in my plan?"

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"That would be very hard to prove at the moment, Juan-Pablo," he replied, then paused. "But I know you too well to think that you would resort to fabrication. Especially when it would serve no useful end. Too many people are involved now for Nanda to retain power. Tell me what you want me to do."

"Has the airlock security system been reset?"

"Yes. You are now considered an enemy of the Federation. Only Nanda has the code that reprograms the computer."

"Then you shall have to do the work," Marcos replied. "Put the defective bio-chem back in its case, bring out the next replacement body and feed Nanda's memories into its brain."

The lieutenant quickly set about the task. "The process can't be rushed, you know. There may not be time."

"Hope that there is," Marcos snapped. "The President alone has the key that will unlock the minds of the people. He has shaped their thinking for a century. Only he can reshape it."

Time sped onward. Minutes rushed by far too quickly as Tomás worked the equipment that prepared a new replacement for The President. It was a job that he had done several times before, but now it seemed totally different.

The last step of the process was now complete. Tomás looked across at Captain Marcos.

"What now?" Tomás asked him.

"Bring the replacement through the airlock. It will admit you."

Tomás rolled the table forward into the airlock, going around the unconscious guards. Sensing only the identification crests worn by the men, the scanner could not question the reason for the paralyzed state of the guards. It only sensed that no enemies were present, and activated. When the far door opened, the lieutenant pushed the table through and joined Juan-Pablo.

Captain Marcos had already removed the three guards from the elevator and bound their hands. He withdrew an anesthetic cartridge from the first-aid kit on the wall, then approached the still inactive replacement.

"It might be better if Nanda did not awaken until after our position has been secured," he said.

"What of the security men who accompanied him tonight?"

"Before they can return to the Capital, our work will be done." Juan-Pablo helped him roll the table into the elevator. "Once we get upstairs, Tomás, order the guards to cease all emergency security measures. And inform them that they will admit a delegation of citizens of the Federation. Get word to Eduardo and Esper—tell them to come at once. I'm sure you know how to reach them."

"Yes, Captain."

"I will take The President to an unused room. And I may need a bit

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of assistance from Dr. Ortez . . ."

He pressed the button for the car to rise. As the elevator doors slid towards each other, the two men caught a glimpse of the emergency transfer console that monitored The President's mind.

The transfer light flashed on, fiery red . . .

Juan-Pablo Marcos watched the eyes of The President blink open. Their unsteady gaze drifted around the meeting room that opened onto a terrace. Many great speeches to the people had been made from that terrace, back when the Federation was still in the process of forming. Speeches were no longer needed in the Capital. They were reserved for the outlying regions, for citizens far removed from the visible workings of government.

Nanda's vision seemed to clear. He became aware of Tomás standing near the door, hand placed casually on his holstered weapon. He saw the expended cartridge on the table beside him, and he saw Juan-Pablo.

"What has happened?" he asked, half knowing.

Nanda sought to rise from the chair where he found himself. But his limbs were slow to respond.

"Your body has been chemically weakened," Marcos explained, indicating the cartridge. "It is only a temporary measure. The effects will wear off soon."

"How did you get back in here? The guards had their orders—"

"That's not important now. The guards have new orders. In the hours you have been unconscious, the rebels have entered the Capital. The opposing forces have been stabilized."

Anger flashed on his face. "What you mean to say is, there has been a revolution!"

"No. There has been no fighting, no bloodshed, no destruction. Only a change in the structure of power."

"It is the same."

"Why? Because you have outlawed change of leadership? Once this country had elections to determine its leaders."

"And what did it prove? That a handful of fools could parade before the people, promise the moon and stars in exchange for votes, and then suit their own petty interests once elected. They were all the same, no matter who won."

Juan-Pablo said evenly: "So instead, you decided to keep the office that was given to you. To become an immortal President by the aid of our science. To betray the trust of those who supported you."

"It was the only way to insure that the Federation would not collapse after me," Nanda replied.

"A noble aim, if true. But it does not justify holding that power for eternity. Nor does it justify the idol-worship you have promoted among the people."

"But don't you see? It is all necessary, it is the key to our success. Mankind has always been plagued

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by the limitations of life. By the time a man has gained enough knowledge and experience to approach true wisdom, there are so few years to make use of it. Despite the fact that we pride ourselves on being the only creatures on earth that can learn from the experience of others, we do not truly learn from anyone but ourselves. Everyone starts from scratch, ignoring the knowledge of others more often than not, and once knowledge *is* sought, it takes a lifetime to gain awareness. The history of man is nothing but a record of the same mistakes, repeated over and over again.

"But I have overcome that. I am the hope and salvation of our people. How can man ever hope to reach perfection when he is confined always to making half starts?"

Juan-Pablo thought. "Maybe it isn't reaching perfection that is important, but how we go about our efforts."

"With that philosophy, Man would forever be in a state of mediocrity between barbarism and civilization!"

"That may be true," Marcos said, searching The President's words for truths and his own mind for doubts. "But I can't help but think that the price of perfection is too high . . . if it costs our freedom."

"And you think you have the right to decide the future of the Federation?"

"No, not as sole ruler, certainly. Nor do you, Excellency, for whatever else you may be, I realize now that you *are* just a man. And no man can truly set himself apart from his fellow man so much as to have the right to dictate the course of their lives. There is a fine line of distinction between a ruler and a leader. The people need advice and guidance. You gave them oppression and a promise of better things to come."

"You think that will end now that the rebels have seized power?" Nanda snapped. "Oh no, Pablo—oppression, as you call it, has many faces, but only one form."

"If this change were only going to be the act of one dictator replacing another, I would not have supported it."

"And what of me? You have spared me, it seems—but for what? A firing squad?"

"No."

"Then why—" he probed, "or are you still undecided as to where your true duty lies?"

"You have had so many lives it seems frivolous to concern myself with saving you. But I will not be responsible for your end. You will live out the life left in this new body. It should be many years, perhaps decades.

"My job is to protect you," Marcos continued, "and protect you I shall. But I shall protect our people from you."

"You have a strange sense of loyalty, Pablo," he said, bitterness in his

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voice and in his expression.

"If it is strange, it is because I find myself in a strange position, where my decisions affect not only myself, but others, to a degree I've never before faced. And there are other reasons why you must not be killed. The people worship you. You are the symbol of the Federation, of their hopes, of everything. To destroy that symbol would be to invite a total collapse of our nation."

"So, you and your co-conspirators plan to rule, with me as puppet leader?"

"That would be no better than what we have now; in fact, worse. There will be changes. It will be announced that we have reached the level of stability and prosperity that we have been striving for, and that the people shall now reap the harvest of their efforts.

"The Federation shall begin to serve them, even as they have served it. There will be new training programs instituted to teach them how to govern themselves. In time, the people shall direct the destiny of the Federation, as is their right."

"You expect me to go along with this plan of yours?"

"No," Marcos replied. "Not willingly, anyway. Although I wish you might, I know only too well that you serve your own interests alone. Those that opposed you before are dead or imprisoned. If I trusted you, my fate would be no better."

"Yet you dare not kill me—I am too valuable to the success of your plan. But remember, Pablo, I still have influence with many people . . . people who fear the consequences of going against my will. I warn you, do not resist me! Your plan is doomed to failure, Pablo. As long as I live, I am a threat to you—*and you dare not kill me!*"

Juan-Pablo turned slightly to one side. He looked away.

"It will not be necessary, my President. And I am glad it will not. That is an important difference between us, I think. You would not think twice about eliminating me for standing in your way. Yet I cannot so coldly kill you. I must not. Idealism so often hides the baser motives of greed and selfishness. For us to become what you were would destroy all that we hope to accomplish. Yet you are right in saying you are a threat to us. For that reason, measures will be taken, measures which have been considered most carefully."

Captain Marcos paused a second. He turned and looked directly at Nanda.

"You see, Excellency, we really need only a part of you. Your face, your voice, your skills in manipulating the thoughts of our people. We do not need your greed for power or your cunning. Your intense drive for self-gain and your utter ruthlessness are not only unnecessary to us, but highly dangerous. But that we will correct. The President shall live. But Nanda, the man, will not."

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The President's voice trembled, his features showing a mixture of fear and outrage. "What are you saying!"

"Simply this—your mind holds many things we need. The information stored there is valuable. But we dare not leave your personality intact. The human mind is a very complex thing, but yours has the remarkable distinction of being housed in a nonhuman body. The scientists who created the synthetic brain of the bio-chem body can just as easily *alter* it. We shall pick and choose what we wish to keep. And those parts of your mind that are dangerous to us . . . we shall purge."

Nanda was aghast. The full weight of Marcos' words struck him suddenly.

"You think yourself a moralist?" he virtually shouted. "You would keep a man alive, and destroy his mind!"

"Is that not what *you* have done, Excellency? Not to one man . . . but to millions? No, I think there is a rare justice in this. The punishment shall fit the crime. What you have robbed from our people you shall pay back. At last, you will aid the Federation—the people—unwillingly, but unselfishly."

Nanda glared out from sullen eyes. "Be careful, Pablo. You are toying with forces that you do not fully comprehend. You may find too much freedom as dangerous as too little."

"There will always be some restrictions. There must be as long as men place personal desire above the rights of others. But our people must also have the right to pick the things they work and sacrifice for. And their causes, if they have them, must be worthwhile, and not merely imposed."

The President sank back wearily in his chair. He sighed deeply. "And so, it is over."

"No," Juan-Pablo replied, "it is just beginning."

"Perhaps," Nanda said, his voice grim. "You may discover that a benevolent dictatorship is not as terrible as you imagine."

"I'm not sure such a thing exists."

"I wonder—will you be such an idealist thirty years from now?"

"If not, there will be others who will. That is one of the advantages, if there can be any, of a limited lifespan. Spirit and imagination are forever being born again, each generation."

The first morning rays of light were warming the office. Color and life and energy blazed on the horizon.

Juan-Pablo opened the door to the outside world and beckoned to The President. "The sun is rising, and with it, the promise of many things. Come Excellency, let us go out and survey this nation of ours. The promise is fulfilled. Tomorrow is here . . ." ■

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Kelly Freas

long shot

The purpose of machinery
is to extend man's ability—in the face
of time, distance, and even death.

VERNOR VINGE

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They named her Ilse, and of all Earth's creatures, she was to be the longest lived—and perhaps the last. A prudent tortoise might survive three hundred years and a bristlecone pine six thousand, but Ilse's designed span exceeded one hundred centuries. And though her brain was iron and germanium doped with arsenic, and her heart was a tiny cloud of hydrogen plasma, Ilse *was*—in the beginning—one of Earth's creatures: she could feel, she could question, and—as she discovered during the dark centuries before her fiery end—she could also forget.

Ilse's earliest memory was a fragment, amounting to less than fifteen seconds. Someone, perhaps inadvertently, brought her to consciousness as she sat atop her S-5N booster. It was night, but their launch was imminent and the booster stood white and silver in the light of a dozen spotlights. Ilse's sharp eye scanned rapidly around the horizon, untroubled by the glare from below. Stretching away from her to the north was a line of thirty launch pads. Several had their own boosters, though none were lit up as Ilse's was. Three thousand meters to the west were more lights, and the occasional sparkle of an automatic rifle. To the east, surf marched in phosphorescent ranks against the Merritt Island shore.

There the fragment ended: she was not conscious during the launch. But that scene remained forever her most vivid and incomprehensible memory.

When next she woke, Ilse was in low Earth orbit. Her single eye had been fitted to a one hundred and fifty centimeter reflecting telescope so that now she could distinguish stars set less than a tenth of a second apart, or, if she looked straight down, count the birds in a flock of geese two hundred kilometers below. For more than a year Ilse remained in this same orbit. She was not idle. Her makers had allotted this period for testing. A small manned station orbited with her, and from it came an endless sequence of radioed instructions and exercises.

Most of the problems were ballistic: hyperbolic encounters, transfer ellipses, and the like. But it was often required that Ilse use her own telescope and spectrometer to discover the parameters of the problems. A typical exercise: determine the orbits of Venus and Mercury; compute a minumum energy flyby of both planets. Another: determine the orbit of Mars; analyze its atmosphere; plan a hyperbolic entry subject to constraints. Many observational problems dealt with Earth: determine atmospheric pressure and composition; perform multispectrum analysis of vegetation. Usually she was required to solve organic analysis problems in less than thirty seconds. And in these last problems, the rules were often changed even while the game was played. Her orientation jets would be caused to malfunction. Critical portions of her mind and senses would be degraded.

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One of the first things Ilse learned was that in addition to her private memories, she had a programmed memory, a "library" of procedures and facts. As with most libraries, the programmed memory was not as accessible as Ilse's own recollections, but the information contained there was much more complete and precise. The solution program for almost any ballistic, or chemical, problem could be lifted from this "library," used for seconds, or hours, as an integral part of Ilse's mind, and then returned to the "library." The real trick was to select the proper program on the basis of incomplete information, and then to modify that program to meet various combinations of power and equipment failure. Though she did poorly at first, Ilse eventually surpassed her design specifications. At this point her training stopped and for the first—but not the last—time, Ilse was left to her own devices.

Though she had yet to wonder on her ultimate purpose, still she wanted to see as much of her world as possible. She spent most of each daylight pass looking straight down, trying to see some order in the jumble of blue and green and white. She could easily follow the supply rockets as they climbed up from Merritt Island and Baikonur to rendezvous with her. In the end, more than a hundred of the rockets were floating about her. As the weeks passed, the squat white cylinders were fitted together on a spidery frame.

Now her ten-meter-long body was lost in the webwork of cylinders and girders that stretched out two hundred meters behind her. Her programmed memory told her that the entire assembly massed 22,563.901 tons—more than most ocean-going ships—and a little experimenting with her attitude control jets convinced her that this figure was correct.

Soon her makers connected Ilse's senses to the mammoth's control mechanisms. It was as if she had been given a new body, for she could feel, and see, and use each of the hundred propellant tanks and each of the fifteen fusion reactors that made up the assembly. She realized that now she had the power to perform some of the maneuvers she had planned during her training.

Finally the great moment arrived. Course directions came over the maser link with the manned satellite. Ilse quickly computed the trajectory that would result from these directions. The answer she obtained was correct, but it revealed only the smallest part of what was in store for her.

In her orbit two hundred kilometers up, Ilse coasted smoothly toward high noon over the Pacific. Her eye was pointed forward, so that on the fuzzy blue horizon she could see the edge of the North American continent. Nearer, the granulated cloud cover obscured the ocean itself. The command to begin the burn came

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from the manned satellite, but Ilse was following the clock herself, and she had determined to take over the launch if any mistakes were made. Two hundred meters behind her, deep in the maze of tanks and beryllium girders, Ilse felt magnetic fields establish themselves, felt hydrogen plasma form, felt fusion commence. Another signal from the station, and propellant flowed around each of ten reactors.

Ilse and her twenty-thousand-ton booster were on their way.

Acceleration rose smoothly to one gravity. Behind her, vidicons on the booster's superstructure showed the Earth shrinking. For half an hour the burn continued, monitored by Ilse, and the manned station now fallen far behind. Then Ilse was alone with her booster, coasting away from Earth and her creators at better than twenty kilometers a second.

So Ilse began her fall toward the sun. For eleven weeks she fell. During this time, there was little to do: monitor the propellants, keep the booster's sunshade properly oriented, relay data to Earth. Compared to much of her later life, however, it was a time of hectic activity.

A fall of eleven weeks toward a body as massive as the sun can result in only one thing: speed. In those last hours, Ilse hurtled downwards at better than two hundred and fifty kilometers per second—an Earth to Moon distance every half hour. Forty-five minutes before her closest approach to the sun—perihelion—Ilse jettisoned the empty first stage and its sunshade. Now she was left with the two-thousand-ton second stage, whose insulation consisted of a bright coat of white paint. She felt the pressure in the propellant tanks begin to rise.

Though her telescope was pointed directly away from the sun, the vidicons on the second stage gave her an awesome view of the solar fireball. She was moving so fast now that the sun's incandescent prominences changed perspective even as she watched.

Seventeen minutes to perihelion. From somewhere beyond the flames, Ilse got the expected maser communication. She pitched herself and her booster over so that she looked along the line of her trajectory. Now her own body was exposed to the direct glare of the sun. Through her telescope she could see luminous tracery within the solar corona. The booster's fuel tanks were perilously close to bursting, and Ilse was having trouble keeping her own body at its proper temperature.

Fifteen minutes to perihelion. The command came from Earth to begin the burn. Ilse considered her own trajectory data, and concluded that the command was thirteen seconds premature. Consultation with Earth would cost at least sixteen minutes, and her decision must be made in the next four seconds. Any of Man's earlier, less sophisticated creations would have accepted the error and taken the mission on to catastrophe,

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but independence was the essence of Ilse's nature: she overrode the maser command, and delayed ignition till the instant she thought correct.

The sun's northern hemisphere passed below her, less than three solar diameters away.

Ignition, and Ilse was accelerated at nearly two gravities. As she swung toward what was to have been perihelion, her booster lifted her out of elliptic orbit and into a hyperbolic one. Half an hour later she shot out from the sun into the spaces south of the ecliptic at three hundred and twenty kilometers per second—about one solar diameter every hour. The booster's now empty propellant tanks were between her and the sun, and her body slowly cooled.

Shortly after burnout, Earth offhandedly acknowledged the navigation error. This is not to say that Ilse's makers were without contrition for their mistake, or without praise for Ilse. In fact, several men lost what little there remained to confiscate for jeopardizing this mission, and Man's last hope. It was simply that Ilse's makers did not believe that she could appreciate apologies or praise.

Now Ilse fled up out of the solar gravity well. It had taken her eleven weeks to fall from Earth to Sol, but in less than two weeks she had regained this altitude, and still she plunged outwards at more than one hundred kilometers per second. That velocity remained her inheritance from the sun. Without the gravity well maneuver, her booster would have had to be five hundred times as large, or her voyage three times as long. It had been the very best that men could do for her, considering the time remaining to them.

So began the voyage of one hundred centuries. Ilse parted with the empty booster and floated on alone: a squat cylinder, twelve meters wide, five meters long, with a large telescope sticking from one end. Four light-years below her in the well of the night she saw Alpha Centauri, her destination. To the naked human eye, it appears a single bright star, but with her telescope Ilse could clearly see two stars, one slightly fainter and redder than the other. She carefully measured their position and her own, and concluded that her aim had been so perfect that a midcourse correction would not be necessary for a thousand years.

For many months, Earth maintained maser contact—to pose problems and ask after her health. It was almost pathetic, for if anything went wrong now, or in the centuries to follow, there was very little Earth could do to help. The problems were interesting, though. Ilse was asked to chart the nonluminous bodies in the Solar System. She became quite skilled at this and eventually discovered all nine planets, most of their moons, and several asteroids and comets.

In less than two years, Ilse was farther from the sun than any known

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planet, than any previous terrestrial probe. The sun itself was no more than a very bright star behind her, and Ilse had no trouble keeping her frigid innards at their proper temperature. But now it took sixteen hours to ask a question of Earth and obtain an answer.

A strange thing happened. Over a period of three weeks, the sun became steadily brighter until it gleamed ten times as luminously as before. The change was not really a great one. It was far short of what Earth's astronomers would have called a nova. Nevertheless, Ilse puzzled over the event, in her own way, for many months, since it was at this time that she lost maser contact with Earth. That contact was never regained.

Now Ilse changed herself to meet the empty centuries. As her designers had planned, she split her mind into three coequal entities. Theoretically each of these minds could handle the entire mission alone, but for any important decision, Ilse required the agreement of at least two of the minds. In this fractionated state, Ilse was neither as bright nor as quick-thinking as she had been at launch. But scarcely anything happened in interstellar space, the chief danger being senile decay. Her three minds spent as much time checking each other as they did overseeing the various subsystems.

The one thing they did not regularly check was the programmed memory, since Ilse's designers had—mistakenly—judged that such checks were a greater danger to the memories than the passage of time.

Even with her mentality diminished, and in spite of the caretaker tasks assigned her, Ilse spent much of her time contemplating the universe that spread out forever around her. She discovered binary star systems, then watched the tiny lights swing back and forth around each other as the decades and centuries passed. To her the universe became a moving, almost a living, thing. Several of the nearer stars drifted almost a degree every century, while the great galaxy in Andromeda shifted less than a second of arc in a thousand years.

Occasionally, she turned about to look at Sol. Even ten centuries out she could still distinguish Jupiter and Saturn. These were auspicious observations.

Finally it was time for the midcourse correction. She had spent the preceding century refining her alignment and her navigational observations. The burn was to be only one hundred meters per second, so accurate had been her perihelion impulse. Nevertheless, without that correction she would miss the Centauran system entirely. When the second arrived and her alignment was perfect, Ilse lit her tiny rocket—and discovered that she could obtain at most only three quarters of the rated thrust. She had to make two burns before she was satisfied with the new course.

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For the next fifty years, Ilse studied the problem. She tested the rocket's electrical system hundreds of times, and even fired the rocket in microsecond bursts. She never discovered how the centuries had robbed her, but extrapolating from her observations, Ilse realized that by the time she entered the Centauran system, she would have only a thousand meters per second left in her rocket—less than half its designed capability. Even so it was possible that, without further complications, she would be able to survey the planets of both stars in the system.

But before she finished her study of the propulsion problem, Ilse discovered another breakdown—the most serious she was to face:

She had forgotten her mission. Over the centuries the pattern of magnetic fields on her programmed memory had slowly disappeared—the least used programs going first. When Ilse recalled those programs to discover how her reduced maneuverability affected the mission, she discovered that she no longer had any record of her ultimate purpose. The memories ended with badly faded programs for biochemical reconnaissance and planetary entry, and Ilse guessed that there was something crucial left to do after a successful landing on a suitable planet.

Ilse was a patient sort—especially in her cruise configuration—and she didn't worry about her ultimate purpose, so far away in the future. But she did do her best to preserve what programs were left. She played each program into her own memory and then back to the programmed memory. If the process were repeated every seventy years, she found that she could keep the programmed memories from fading. On the other hand, she had no way of knowing how many errors this endless repetition was introducing. For this reason she had each of her subminds perform the process separately, and she frequently checked the ballistic and astronomical programs by doing problems with them.

Ilse went further: she studied her own body for clues as to its purpose. Much of her body was filled with a substance she must keep within a few degrees of absolute zero. Several leads disappeared into this mass. Except for her thermometers, however, she had no feeling in this part of her body. Now she raised the temperature in this section a few thousandths of a degree, a change well within design specifications, but large enough for her to sense. Comparing her observations and the section's mass with her chemical analysis programs, Ilse concluded that the mysterious area was a relatively homogeneous body of frozen water, doped with various impurities. It was interesting information, but no matter how she compared it with her memories she could not see any significance to it.

Ilse floated on—and on. The period of time between the midcourse maneuver and the next important event on her schedule was longer

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than Man's experience with agriculture had been on Earth.

As the centuries passed, the two closely set stars that were her destination became brighter until, a thousand years from Alpha Centauri, she decided to begin her search for planets in the system. Ilse turned her telescope on the brighter of the two stars . . . call it Able. She was still thirty-five thousand times as far from Able—and the smaller star . . . call it Baker—as Earth is from Sol. Even to her sharp eye, Able didn't show as a disk but rather as a diffraction pattern: a round blob of light—many times larger than the star's true disk—surrounded by a ring of light. The faint gleam of any planets would be lost in that diffraction pattern. For five years Ilse watched the pattern, analyzed it with one of her most subtle programs. Occasionally she slid occulting plates into the telescope and studied the resulting, distorted, pattern. After five years she had found suggestive anomalies in the diffraction pattern, but no definite signs of planets.

No matter. Patient Ilse turned her telescope a tiny fraction of a degree, and during the next five years she watched Baker. Then she switched back to Able. Fifteen times Ilse repeated this cycle. While she watched, Baker completed two revolutions about Able, and the stars' maximum mutual separation increased to nearly a tenth of a degree. Finally Ilse was certain: she had discovered a planet orbiting Baker, and perhaps another orbiting Able. Most likely they were both gas giants. No matter: she knew that any small, inner planets would still be lost in the glare of Able and Baker.

There remained less than nine hundred years before she coasted through the Centauran system.

Ilse persisted in her observations. Eventually she could see the gas giants as tiny spots of light—not merely as statistical correlations in her carefully collected diffraction data. Four hundred years out, she decided that the remaining anomalies in Able's diffraction pattern must be another planet, this one at about the same distance from Able as Earth is from Sol. Fifteen years later she made a similar discovery for Baker.

If she were to investigate both of these planets she would have to plan very carefully. According to her design specifications, she had scarcely the maneuvering capability left to investigate one system. But Ilse's navigation system had survived the centuries better than expected, and she estimated that a survey of both planets might still be possible.

Three hundred and fifty years out, Ilse made a relatively large course correction, better than two hundred meters per second. This change was essentially a matter of pacing: it would delay her arrival by four months. Thus she would pass near the planet she wished to investigate and, if no landing were attempted, her path would be precisely bent by Able's gravitational field and she

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would be cast into Baker's planetary system.

Now Ilse had less than eight hundred meters per second left in her rocket—less than one percent of her velocity relative to Able and Baker. If she could be at the right place at the right time, that would be enough, but otherwise . . .

Ilse plotted the orbits of the bodies she had detected more and more accurately. Eventually she discovered several more planets: a total of three for Able, and four for Baker. But only her two prime candidates—call them Able II and Baker II—were at the proper distance from their suns.

Eighteen months out, Ilse sighted moons around Able II. This was good news. Now she could accurately determine the planet's mass, and so refine her course even more. Ilse was now less than fifty astronomical units from Able, and eighty from Baker. She had no trouble making spectroscopic observations of the planets. Her prime candidates had plenty of oxygen in their atmospheres—though the farther one, Baker II, seemed deficient in water vapor. On the other hand, Able II had complex carbon compounds in its atmosphere, and its net color was blue green. According to Ilse's damaged memory, these last were desirable features.

The centuries had shrunk to decades, then to years, and finally to days. Ilse was within the orbit of Able's gas giant. Ten million kilometers ahead her target swept along a nearly circular path about its sun, Able. Twenty-seven astronomical units beyond Able gleamed Baker.

But Ilse kept her attention on that target, Able II. Now she could make out its gross continental outlines. She selected a landing site, and performed a two hundred meter per second burn. If she chose to land, she would come down in a greenish, beclouded area.

Twelve hours to contact. Ilse checked each of her subminds one last time. She deleted all malfunctioning circuits, and reassembled herself as a single mind out of what remained. Over the centuries, one third of all her electrical components had failed, so that besides her lost memories, she was not nearly as bright as she had been when launched. Nevertheless, with her subminds combined she was much cleverer than she had been during the cruise. She needed this greater alertness, because in the hours and minutes preceding her encounter with Able II, she would do more analysis and make more decisions than ever before.

One hour to contact. Ilse was within the orbit of her target's outer moon. Ahead loomed the tentative destination, a blue and white crescent two degrees across. Her landing area was around the planet's horizon. No matter. The important task for these last moments was a biochemical survey—at least that's what her surviving programs told her. She

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scanned the crescent, looking for traces of green through the clouds. She found a large island in a Pacific sized ocean, and began the exquisitely complex analysis necessary to determine the orientation of amino acids. Every fifth second, she took one second to re-estimate the atmospheric densities. The problems seemed even more complicated than her training exercises back in Earth orbit.

Five minutes to contact. She was less than forty thousand kilometers out, and the planet's hazy limb filled her sky. In the next ten seconds she must decide whether or not to land on Able II. Her ten-thousand-year mission was at stake here. For once Ilse landed, she knew that she would never fly again. Without the immense booster that had pushed her out along this journey, she was nothing but a brain and an entry shield and a chunk of frozen water. If she decided to bypass Able II, she must now use a large portion of her remaining propellants to accelerate at right angles to her trajectory. This would cause her to miss the upper edge of the planet's atmosphere, and she would go hurtling out of Able's planetary system. Thirteen months later she would arrive in the vicinity of Baker, perhaps with enough left in her rocket to guide herself into Baker II's atmosphere. But, if that planet should be inhospitable, there would be no turning back: she would have to land there, or else coast on into interstellar darkness.

Ilse weighed the matter for three seconds and concluded that Able II satisfied every criterion she could recall, while Baker II seemed a bit too yellow, a bit too dry.

Ilse turned ninety degrees and jettisoned the small rocket that had given her so much trouble. At the same time she ejected the telescope which had served her so well. She floated indivisible, a white biconvex disk, twelve meters in diameter, fifteen tons in mass.

She turned ninety degrees more to look directly back along her trajectory. There was not much to see now that she had lost her scope, but she recognized the point of light that was Earth's sun and wondered again what had been on all those programs that she had forgotten.

Five seconds. Ilse closed her eye and waited.

Contact began as a barely perceptible acceleration. In less than two seconds that acceleration built to two hundred and fifty gravities. This was beyond Ilse's experience, but she was built to take it: her body contained no moving parts and—except for her fusion reactor—no empty spaces. The really difficult thing was to keep her body from turning edgewise and burning up. Though she didn't know it, Ilse was repeating—on a grand scale—the landing technique that men had used so long ago. But Ilse had to dissipate more than eight hundred times the kinetic energy of any returning Apollo capsule. Her maneuver was correspond-

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ingly more dangerous, but since her designers could not equip her with a rocket powerful enough to decelerate her, it was the only option.

Now Ilse used her wits and every dyne in her tiny electric thrusters to arc herself about Able II at the proper attitude and altitude. The acceleration rose steadily toward five hundred gravities, or almost five kilometers per second in velocity lost every second. Beyond that Ilse knew that she would lose consciousness. Just centimeters away from her body the air glowed at fifty thousand degrees. The fireball that surrounded her lit the ocean seventy kilometers below as with daylight.

Four hundred and fifty gravities. She felt a cryostat shatter, and one branch of her brain short through. Still Ilse worked patiently and blindly to keep her body properly oriented. If she had calculated correctly, there were less than five seconds to go now.

She came within sixty kilometers of the surface, then rose steadily back into space. But now her velocity was only seven kilometers per second. The acceleration fell to a mere fifteen gravities, then to zero. She coasted back through a long ellipse to plunge, almost gently, into the depths of Able II's atmosphere.

At twenty thousand meters altitude, Ilse opened her eye and scanned the world below. Her lens had been cracked, and several of her gestalt programs damaged, but she saw green and knew her navigation hadn't been too bad.

It would have been a triumphant moment if only she could have remembered what she was supposed to do *after* she landed.

At ten thousand meters, Ilse popped her paraglider from the hull behind her eye. The tough plastic blossomed out above her, and her fall became a shallow glide. Ilse saw that she was flying over a prairie spotted here and there by forest. It was near sunset and the long shadows cast by trees and hills made it easy for her to gauge the topography.

Two thousand meters. With a glide ratio of one to four, she couldn't expect to fly more than another eight kilometers. Ilse looked ahead, saw a tiny forest, and a stream glinting through the trees. Then she saw a glade just inside the forest, and some vagrant memory told her this was an appropriate spot. She pulled in the paraglider's forward lines and slid more steeply downwards. As she passed three or four meters over the trees surrounding the glade, Ilse pulled in the rear lines, stalled her glider, and fell into the deep, moist grass. Her dun and green paraglider collapsed over her charred body so that she might be mistaken for a large black boulder covered with vegetation.

The voyage that had crossed one hundred centuries and four light-years was ended.

Ilse sat in the gathering twilight and

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listened. Sound was an undreamed of dimension to her: tiny things burrowing in their holes, the stream gurgling nearby, a faint chirping in the distance. Twilight ended and a shallow fog rose in the dark glade. Ilse knew her voyaging was over. She would never move again. No matter. That had been planned, she was sure. She knew that much of her computing machinery—her mind—had been destroyed in the landing. She would not survive as a conscious being for more than another century or two. No matter.

What did matter was that she knew that her mission was not completed, and that the most important part remained, else the immense gamble her makers had undertaken would finally come to nothing. That possibility was the only thing which could frighten Ilse. It was part of her design.

She reviewed all the programmed memories that had survived the centuries and the planetary entry, but discovered nothing new. She investigated the rest of her body, testing her parts in a thorough, almost destructive, way she never would have dared while still centuries from her destination. She discovered nothing new. Finally she came to that load of ice she had carried so far. With one of her cryostats broken, she couldn't keep it at its proper temperature for more than a few years. She recalled the apparently useless leads that disappeared into that mass. There was only one thing left to try.

Ilse turned down her cryostats, and waited as the temperature within her climbed. The ice near her small fusion reactor warmed first. Somewhere in the frozen mass a tiny piece of metal expanded just far enough to complete a circuit, and Ilse discovered that her makers had taken one last precaution to insure her reliability. At the base of the icy hulk, next to the reactor, they had placed an auxiliary memory unit, and now Ilse had access to it. Her designers had realized that no matter what dangers they imagined, there would be others, and so they had decided to leave this back-up cold and inactive till the very end. And the new memory unit was quite different from her old ones, Ilse vaguely realized. It used optical rather than magnetic storage.

Now Ilse knew what she must do. She warmed a cylindrical tank filled with frozen amniotic fluid to thirty-seven degrees centigrade. From the store next to the cylinder, she injected a single microorganism into the tank. In a few minutes she would begin to suffuse blood through the tank.

It was early morning now and the darkness was moist and cool. Ilse tried to probe her new memory further, but was balked. Apparently the instructions were delivered according to some schedule to avoid unnecessary use of the memory. Ilse reviewed what she had learned, and decided that she would know more in another nine months. ■

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P. Schuyler Miller

THE GERMAN VERNE

American science fiction has been a hybrid of two main traditions on the late nineteenth century—the approaches of Jules Verne in France and H. G. Wells in England. For some reason, English-speaking readers have known very little about what was being written in Germany of the Verne-Wells era. In particular, although his "Auf Zwei Planeten" seems to have been translated into every other language known to man, there has never until now been an English version of Kurd Lasswitz' classic novel about Martians attempting to take over Earth. Now, at last, we have an abridgment as "Two Planets," published by Southern Illinois University Press (Carbondale, Illinois, 1971; 405 pp. $10.00).

The original two-volume monster, published in Germany in 1897, was abridged in 1948 by Erich Lasswitz, the author's son. This was reprinted in 1969, and is the edition used by the translator, Hans Rudnick, who restored some of the original ideas that were apparently considered too extreme in 1948.

If this translation is a good one—and it reads well—Lasswitz was no Wells, but he was better than Verne when it came to extrapolation and free-wheeling imagination. I don't know whether Hugo Gernsback ever read the original—as a German-speaking Luxembourger, he certainly could have—but there is certainly a direct evolutionary line from Verne, via Lasswitz, to "Ralph 124C41+" and the early years of *Amazing Stories* and *Science Wonder Quarterly*. Gernsback gave us translations of other, newer German science fiction; perhaps the job of boiling this monster down to something manageable was too much for him.

In skeleton, a German expedition to discover the North Pole by bal-

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loon is drawn into an updraft caused by a Martian space station, hovering directly over the pole on an antigravity beam. The leader of the expedition escapes and is picked up by Eskimo hunters; his two companions are taken in by the Martians . . . and in no time we have three parallel plots in motion, in good nineteenth century style. Four, really, for it turns out that the son of a survivor of a previous Martian expedition is alive in Germany.

The Martians, unlike Wells', are entirely human; there is a functional romance between one hero and a Martian heroine; the marooned Ell is himself a hybrid. Until a chip-on-his-shoulder British officer opens fire on a group of Martians, everything is proceeding smoothly and well. (Presumably, English and American publishers have refused until now to sponsor an English translation of a book with English-speaking villains.)

Here the book converts itself from a Vernian extrapolation of science and engineering to a Wellsian utopia (or dystopia). The heroes are taken back to Mars and shown the smooth-running Martian society . . . but when it is impressed on Earth, things don't run all that well, and the fault is not all human. Rather, it is human—but the human frailties are ingrained in Martians as well as the people of Earth. So the world rebels against the alien "Protectorate."

Professor Mark R. Hillegas of Southern Illinois University, author of "The Future as Nightmare," closes the book with a short essay which I think you might read first, even though it does "give away" some details of the plot. That should be predictable in any case; it's been used often enough, before and since Lasswitz wrote. "On Two Planets" had a tremendous effect on young Germans of the era when the *Verein für Ramschiffahrt* was scraping together marks and pfennigs to pay for its experiments with liquid-fuel rockets, when Willy Ley was building his correspondence with space-dreamers all over the world and Wernher Von Braun was a teen-ager. It may consequently have had more functional influence than any science fiction novel ever written.

I don't know whether Jules Verne could read German, or whether there was a translation that he could have read, before his death. I think he'd have liked it—including the technical dissertations that were so much a part of his own books, and that have been largely edited out of this abridgment. He would probably have snorted at those polar bears that wrecked the first Martian expedition to the South Pole, too.

But if ancient classics are to your taste, this one is far more readable than you'd suppose . . . and far more like present-day SF than anything you'll find in Verne.

SON OF MAN

By Robert Silverberg • Ballantine Books, N.Y. • No. 02277-7-125 • 213 pp. • $1.25

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This is the year when Robert Silverberg may very well do himself out of a Nebula or Hugo award for best SF novel of 1971 by competing with himself. He slugged us with three major books, almost at the same time: "A Time of Changes," "The World Inside," and this one. Any of the three would stand a good chance of winning if it weren't competing against the other two. And they are all completely different.

"Son of Man" is Silverberg's strangest book, which may count against it, at least with the fan-voted Hugo awards. (The Science Fiction Writers of America may vote it a Nebula out of sheer awe and envy.) In a way, it is his counterpart of Olaf Stapledon's "Last and First Men," in that it shows us a vision of a far future where the sons and daughters of polymorphous humanity have been drawn together. In atmosphere and symbolism, though, it is more like Lewis's "Perelandra" or, better, the mystical novels of Charles Williams.

The book is not "about" anything . . . yet it is about all mankind. Clay, a man of our time, wakes in a future to which "the time-flux" has carried him. He encounters Hanmer, one of a little band of men/women of that time (they can be either, as their mood or the occasion requires), with powers that earn them the tag of "Skimmers." In a way, and as part of their own intricate ceremony of living, they show him their world and its people—other sons of Man, scooped up like himself from billions of years of Earth's future.

Clay molds himself into the forms and minds of these men, as they have molded their own forms and minds. He changes sex like the Skimmers . . . he becomes a river . . . a rooted rock . . . a water monster. He makes a kind of pilgrimage through the regions that have become attributes and essences. He hears the incessant weeping of Wrong, who tells him near the end:

"They did not know your nature until you came, and now that they know it, they fear you, for you are in them. As you are in all of us."

And as they are all in him.

Books like this make the nonsense mode of the "new wave" ridiculous. Robert Silverberg, in the last few years, has made himself a one-man American new wave that is never too precious or arrogant to communicate. He experiments: both this book and "The World Inside" are written in the present tense, and in this it would take years to trace and ravel the symbols and concepts.

Scientific instruments, nowadays, are designed to be operated in many modes, which share certain principles and structures but serve different functions. Books like this show that science fiction is a literature of many modes, which can take many forms and serve many purposes. What the radicals of the new wave were and are saying is that it must not let itself stagnate in one mode. What Robert Silverberg is showing is that it can still communicate.

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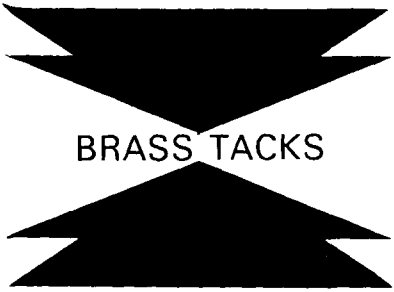

Dear Ben:

I feel it incumbent upon me to protest about the immorality which has crept into Analog and which, I am sure, John Campbell would never have permitted.

I refer specifically to the story by Frederik Pohl, "The Gold at the Starbow's End," where on page 35 a distinctly NON-OPTIMAL ENCODING OF THE ALPHABET IS USED TO GÖDELIZE A MESSAGE.

Any reasonable, decent, God-fearing person would not encode SPACE, A, B, . . . Z, by 0, 1, et cetera, but rather would use the characters in some descending order of frequency in order to decrease the size of the Gödel number.

I hope that in the future it will not be necessary to recall you to the high moral standards of your predecessor in these matters.

The other references to extrapolations in sex, drugs, and politics were handled in a much more mature manner than the mathematics and thus were not offensive.

ANTHONY LEWIS
33 Unity Avenue
Belmont, Massachusetts 02178
The editor stands properly abashed.

Dear Sir:

I agree with your March 1972 editorial. Men locked in prison are a waste of natural resources. Many will call the suggested techniques "brainwashing," but it's a damn sight better than letting a person rot in jail or letting a habitual offender go free. This technique should also satisfy both sides of the "death penalty" argument.

ELLIS WHITBY
459 Park Lane
State College, Pa. 18601
"Brainwashing" is education—of an unwilling student.

Dear Sir:

I wish to offer my own answer to Peter Acaba's letter: What the world needs is fewer Americans, fewer Russians, fewer Frenchmen and Germans and Chinese, and more PEOPLE—human beings—citizens of the world, and not citizens of countries and continents. The world needs more people who consider themselves as members of the human race, and fewer who think of themselves and others as Caucasians, Negroids, and Mongoloids.

One last thing—"A Matter of Sovereignty" was great. How about an-

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other story by its author, Wade Curtis?

KENNETH C. MITCHELL
16 Newbury Street
Auburn, Maine 04210

The era of the Terrans—as opposed to national identities—has yet to dawn.

Dear Mr. Bova:

Your editorial, "The Popular Wisdom" (February, 1972), is in the best tradition of Analog under the master, but you made just a wee slip in the facts:

(1) Knoll and Ruska built the first electron microscope in 1931-32, and the first electron micrographs of biological material were made by Marton in 1934. This is hardly post-World-War II!

(2) Until I do something earth-shaking, almanacs will continue to indicate my birthdate as the first demonstration of televison on 7 April 1926.

RICHARD E. WENDT, JR.
348 Maple Avenue
Edgewood, Pennsylvania 15218

Er . . . would you accept "poetic license"?

Dear Sir:

With reference to your article "Galactic Geopolitics" in Analog, January 1972, I would like to make some points apparently disregarded by the author.

One of the first points he raised was that to all intents and purposes, we would not interact with any intelligent race not of our own order of civilization. This might not be true. Man is using up Earth's resources, and they will, all too soon, be exhausted. If man should be star-bound by this time, and discover a mineral-rich world, with a primitive race on it, either we would teach them how to mine the required minerals and swap these minerals for scientific knowledge, or, far more likely, our descendants will enslave the primitives . . . and if there is resistance, kill them. Slaves might be inefficient but it would be much cheaper than using man's (by now) almost exhausted resources to do the mining.

And as for his point that really advanced civilizations wouldn't be concerned with us because of our primitiveness—this isn't necessarily true either. To a highly advanced and very peaceful civilization, nothing would be more dangerous than a race of murderous fools, incapable of acting sensible, and with large xenophobic and egoistic factors in their psychological makeup. As this is a fair description of us from such a race's point of view, such a race would probably either sterilize our world, or "civilize" us, with no telling which.

A. DOODES
29 Boundary Drive
Hutton, Brentwood
Essex, England

If we have the resources to go star-roving, would we need another planet's minerals? And, although we're fearsome enough to scare our-

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selves, a much more advanced race might consider us as much a threat as we consider the praying mantis—a fearsome predator, but not in our league!

Dear Mr. Bova:

About your science article of January, what if these tunnels in space were only one way? A starship could get somewhere-somewhen else but not back again. Could the tunnels be two-way streets? Approach the star with a certain velocity, assume the hole or tunnel is symmetric, then the force of gravity that pulls you to the center of the hole should be exactly countered by the pull that fights your leaving the hole, which would leave you moving away from the hole at the same velocity you approached it. Nice and neat, except, where and when would you be? Lots of fun for future stories—also for future galactic mapmakers.

PENNY HANSEN
1607 Lincolnwood
Urbana, Illinois 61801

Several writers have independently hit on the Black Hole tunneling effect for interstellar travel. See Joe Haldeman's "Hero" in our June issue.

Sir:

Best of luck to you. I hope for your sake and for mine as a reader since 1934 that you can carry on John Campbell's work—but you and he both should have checked your Constitution better. Till 1913, U.S. Senators were elected by state legislators, not appointed by governors!

JOHN W. BOWLING
1309 North Lynnbrook Drive
Arlington, Virginia 22201

A number of people caught my mistake—including John Campbell!

Dear Sir:

This is a letter in praise of the story "A Spaceship for the King" by Jerry Pournelle. I would like to see more of Mr. Pournelle's work, and I would appreciate it if you would communicate the contents of this letter to him.

"Spaceship" is a thundering good adventure story and gave me much pleasure. I would greatly enjoy seeing it expanded to a full-length novel if Mr. Pournelle has the desire to do so, for I think it would be extremely well received . . .

I hope to see at least one sequel, wherein King David and the somewhat xenophobic Dougal attempt to build their spaceship under the noses of the visiting Imperials, and then have the problem of deciding how best to use it to enhance the status of their world. And lastly, the backdrop for "Spaceship" is remarkably rich and contains the germ of many a fine tale. Imperial politics, for example, would be fascinating. The whole "Navy-versus-ITA" question is the framework for a story.

SAM SPARCK
4099 Laguna Way
Palo Alto, California 94306

There will be more Pournelle stories coming up, rest assured!

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The Disasters That Weren't
continued from page 7

rester and his colleagues were applying the computer simulation technique to models of cities, government agencies, and the entire world.

The technique was adapted by a group of MIT researchers, led by Professor Dennis Meadows, for an examination of the interrelationships of world population growth, industrial and farm output, pollution, and natural resources. Under the sponsorship of the Club of Rome, an international group of industrialists, scientists, educators and civil servants, this world model's predictions for the future were published earlier this year in a book called "The Limits to Growth."

Very simply, the study shows that disaster in spades is waiting for mankind within the coming century. According to the computer world model, if we don't change our growth-oriented society drastically, we will have used up all our natural resources, produced so much pollution and overpopulated our planet so badly, that the entire world society will collapse. Resources run out. Food and industrial production tumble. Death rate climbs out of sight. Mass starvation and, presumably, war. All this is shown on clear, inexorable-looking graphs. The curves for population, industrial production, farm output, and natural resources all peak early in the twenty-first century, then collapse.

Superdisaster.

And it's very real—if you grant two assumptions.

The first assumption is that our world society will not change. Given our free choice, we will continue to opt for more industrial production, no birth control, faster and faster consumption of our natural resources. This is the basic point that the MIT team wants to make: that we cannot continue to have a growing society. We must stop our drive for constant growth and stabilize our population, production, and consumption.

The MIT team played as fairly as they could with the data. They produced computer runs in which world resources were doubled, and even virtually unlimited. Pollution or population rises to bring on the disaster. Models with increased food production or voluntary birth control programs were also tried; they end in mass famines, because the population always rises to eventually outstrip food production.

All this begins to sound like Malthus-in-a-computer, and we have a right to be wary. But granting the assumption that we make no fundamental changes in our society, the computer's rumblings must be taken very seriously. (As a side issue, it seems that the MIT group didn't give much weight to the advent of nuclear fusion power, which will have

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the effect of enormously enhancing our available natural resources and reducing pollution drastically.)

The computer also shows models in which society has changed, where stability is the order of the day, rather than growth. In these models, industrial production, food consumption, population and pollution levels are all very stable, very level. Everybody has the same per capita food consumption and industrial production for as far out as the graphs go.

But no matter how stable the world society, that sneaky curve showing natural resources keeps creeping downward. After all, the world has only a finite supply of natural resources. Right?

Of course not!

Which brings us to the second tacit assumption of the MIT group. They assumed that humankind is bound to planet Earth, and only planet Earth.

They assumed that our world is a closed ecological unit. But they ignored the fact that we have in our grasp the means to make an open-ended ecological system—or at the very least, a system of enormously larger size and scope than the computer was programmed to consider.

In fact, the *real* meaning of the MIT study is that we cannot exist much longer without opening up the solar system as a source of natural resources. The MIT people have produced the best argument for a strong space program that's ever been put on paper, and their book should be received with joy and dancing in the halls of NASA.

Certainly, no sensible person would advocate a "slash and burn" rape of the solar system, where we greedily rip out the natural resources we want without regard to the larger ecological questions. We've nearly destroyed ourselves on this planet with that kind of attitude; let's not make the eventual disaster even wider.

Clearly, we're in a race with disaster here on Earth. And equally clearly we can forestall this disaster indefinitely by utilizing the resources of other worlds. Whether we will react quickly enough to win this race is a real and unanswered problem, at this moment.

If we don't use the resources of the solar system to prevent disaster here on Earth, what other alternatives are there?

Only two: the disaster, or a stabilized world society. Now, stability might look great to a computer, but to most human beings it means control. And not self-control, either: state-imposed controls on food consumption, on jobs, on family planning . . . the world of 1984, maybe a half-century later than predicted, but just as gruesome, nonetheless.

The alternatives, then, are: (1) worldwide disaster; (2) worldwide stability with its concomitant controls; or (3) expansion into the solar system and, ultimately, to the stars.

Which would you choose?

THE EDITOR

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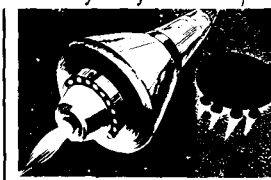

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